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***Tools for Understanding
Electroacoustic Music***

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I. Declaration

I declare that the work described in this thesis was originally carried out by me during the period of registration for the degree of Doctor of Philosophy at De Montfort University from October 2010 to March 2014. The contents of this thesis have not been submitted for another degree at De Montfort University or elsewhere.

II. Acknowledgements

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1.0 Abstract

There is an arguable lack of activity and interest in the analysis of electroacoustic music when compared to its composition and performance. The absence of a strong and active analytical community is very concerning, as it should be a fundamental part of any larger musical community that wishes for works to be performed and discussed in later years¹. The problems that face electroacoustic music analysis are that there is no consensus or single analytical tool/methodology that dictates how such an activity should be undertaken. Rather than attempting to appropriate existing tools meant for traditional musics or create a new universal one this thesis will argue that a new culture should be adopted that promotes different opinions on the subject of electroacoustic music analysis, as opposed to defining a consensus as to how it should be conducted. To achieve this the thesis will: evaluate and critique what constitutes and defines electroacoustic music analysis; provide a general and flexible procedure to conduct an analysis of an electroacoustic work; develop a set of criteria and terms to cross-examine the current analytical tools for electroacoustic music in order to define the gaps in the field and to identify pertinent elements within electroacoustic works; analyse a number of electroacoustic works to test and implement the ideas raised within this thesis; and finally the concept of an analytical community (in which such a culture

¹ This issue is only compounded by the fragility of the digital media and whether specific audio formats will be supported in the coming years.

could exist) is outlined and implemented with the creation of the OREMA (Online Repository for Electroacoustic Music Analysis) project. This universal approach will cover both epistemological and ontological levels of electroacoustic music analysis. All of the concepts raised above are interlinked and follow the main hypothesis of this thesis²:

- There is no one single analysis that can fully investigate a work;
- Analyses are a perspective on a work, ultimately formed through the subjective perception of the analyst;
- These perspectives should be shared with other practitioners to help develop a better understanding of the art form.

This PhD study was part of the New Multimedia Tools for Electroacoustic Music Analysis project (2010-2013) funded by the Arts and Humanities Research Council (UK). Other outcomes of that project included the various analysis symposiums held at De Montfort University in Leicester and the electroacoustic analysis software EAnalysis³ created by Pierre Couprie⁴.

² These concepts are not only related to just electroacoustic music, but are essential for a new culture to exist.

³ http://logiciels.pierrecouprie.fr/?page_id=402

⁴ The majority of the visual analyses in this thesis have been created using this software.

2.0 Introduction – Literature review

2.1 Analysis summary – philosophy and historical analytical positions

This chapter will summarise and review the vast amount of literature and concepts concerning electroacoustic music analysis. Research for this literature review, although primarily concerned with electroacoustic music analysis, will also cover texts concerning perception, music memory, interpretation and meaning. This chapter will also try to expose emerging themes and attitudes in order to convey what areas, specifically in relation to electroacoustic music analysis, require further development and investigation.

2.1.1 Brief introduction to music analysis

The traditional definition of music analysis, as found within the New Grove Dictionary distinguishes analysis as “the resolution of a musical structure into relatively simpler constituent elements, and the investigation of the functions of those elements, within that structure” (Bent 1980: 340). Furthermore, this musical structure is measured against other examples of work considered to be within the same style of music; thus a distinction is made between *formal* and *stylistic* analysis (Bent 1980: 340). Cook (1994: 16) further defines this distinction by

stating that there are essentially two analytical acts: *omission* and *relation*, in an attempt to simplify and communicate specific elements of a piece.

[...] an analysis that does not simplify the music for you is really a complete waste of time. After all, there is no virtue in reduction as such: only in the kind of reduction that makes something intelligible to you that wasn't otherwise (Cook 1994: 24).

Many other musical dictionaries that focus on structure within their description echo this definition. Older definitions, such as the 2nd edition of the *Harvard dictionary of music*, put a greater emphasis on harmony, melody and orchestration (Apel 1969: 36).

There is a clear process being presented by these definitions; some degree of deconstruction takes place in order to reveal underlying constructs that can aid in answering a question related to the composition itself. These constituent elements can then be reassembled, through the act of synthesis, in order to understand the structural relationships within a work and its relation to other works of a similar or even dissimilar style. Kramer (2011: 21), like many other scholars, considers a third dimension to this, which is termed *extramusical*, referring to the social and historical fields that surrounding a particular work⁵.

The act of analysis was initially a pedagogical tool to teach students how one crafts

⁵ Kramer does not make a distinction between the work as a single entity and the canon or style of music it might be encompassed by.

a musical work. However, the field of music analysis has continued to expand and is now considered a part of musicology and compositional studies. Its new aim is to broaden the knowledge and understanding in relation to music, with a specific focus on answering the question: how does this piece work? To simplify the uses of analysis Clarke (2010: 37) states that “composers want to discover, listeners want to explore and musicologist want to compare”⁶.

Humans affect, interpret, map, and model – in actions, images, sounds, verbal languages, or that special language we call mathematics – the universe and all of its processes and features. Our maps and models are our means of understanding the universe and its elements. Musical and artistic works are precisely such models; and, in a continuing process, we model these works in order to understand them as well (Cogan 1984: 18).

Understandably analysis has become an integral part of music theory within conservatoires and universities, the focus of which tends to be on models and melodic functions that simulate the music. The criticism, by Kramer, of music analysis is that it has historically been focused on these hermetic qualities⁷ (2011: 144). He concludes that many analysis journals focus on the elements and structures within works and not their political, ideological or historical implications (Kramer 2011: 145).

⁶ Young (2004: 8) continues this point by stating that “analysis for the composer is a process of gaining understanding of the materials that will give rise to the musical ‘outcome’, and for the musicologist, analysis dissects and contextualises the final musical ‘fact’”.

⁷ Kramer’s definition of *hermetic qualities* is aspects of music that are potentially difficult to understand and are only intended for people with specialist knowledge on the subject. Kramer (2011: 144) explains “even the simplest descriptions, say the labelling of an interval or a chord, call on an assumed body of technical knowledge that, at least initially, does not seem to point beyond itself”.

The outcomes of analytical investigations are divided into two areas: *formalised* and *non-formalised* analyses (Nattiez 1990: 161). Non-formalised analysis can best be described as a written analysis, which Nattiez further divides into three specific styles: *impressionistic*, *paraphrases* and *hermeneutic readings*. Formalised analysis is when one tries to model or simulate the music without using language. This can be achieved by using symbols to illustrate potential schemas or musical rhetoric that exists within the work. In either of these examples concessions have to be made in order to provide the fixity needed to discuss the music outside its experience. In doing so one has to sacrifice the temporal experience of listening to music to adopt an analytical position towards the object of study (what one is analysing). Considering this there is no way to avoid the “falsification” of music (Cook 1998: 71); that is removing it from the temporal experience in order to describe and understand it. What is more important is not to confuse the temporal experience with these “imaginary objects” and, as readers, understand that such concessions are necessary for communication (Cook 1998: 71). Musical analysis, by its very nature, is the falsification of music.

For many years the score was the central object of study within instrumental music. Cook (1994: 16) suggests that this performance score is in fact an “unsystematic analysis of musical sound” as it sacrifices ‘detailed representation in the interests of clarity’. Nattiez’s (1990: 73) description of the score being used as an analysis corresponds to Cook’s definition as he states, “from an analytical standpoint,

notation is an image – imperfect but indispensable – of that notation’s sonorous equivalent”. Clearly a score omits some of information regarding a piece’s performance in order to make sure it is legible for the reader/performer. What is interesting is that there are two main reasons for a score: to perform and work and to analyse it. The latter falls into the area of analysis to varying degrees; however, it is only recently that attention has been given to analysing the performance⁸ of a work. In performing a work an instrumentalist, through interpreting the score, is meant to address its omissions by adding nuance⁹.

2.1.2 Electroacoustic music analysis

One thing that separates electroacoustic music from other forms of music is that there is no precedent for analysis. This isn’t surprising considering that the analysis of instrumental music, as a pursuit in its own right, was only established in the late 19th century (Bent 1980: 343). In the last few years there has been an increased number of tools¹⁰ and analyses of electroacoustic music, specifically within acousmatic research. However, there is no central consensus on the correct tools or methodologies for the variety of different categories of electroacoustic music. Many prominent publications on analysis, such as *spectromorphology* (Smalley

⁸ Wallace Berry’s *Musical Structure and Performance* (1989) was one of the first texts to make a distinction between analysis and performance analysis.

⁹ Many scores do include directions to further describe the intended performance, but the performer also has to interpret these as well. Adjectives are not clear indicators that communicate explicit actions.

¹⁰ The word *tool* in this instance is used to define an analytical methodology and not a software application that analyses sound material.

1986 and 1997) and *typo-morphology* (Schaeffer 1966), only discuss single sound events and not their relations with other sonic materials to create musical structures. Furthermore, these methodologies are intended for acousmatic music¹¹. Other publications that do consider musical structures, such as Roy's *grille fonctionnelle* (2003), need to be used in conjunction with other methodologies that identify individual sound events. Hence, there is no one explicit 'tool' that can fully analyse a single work.

This lack of a general consensus might be viewed as a negative attribute of electroacoustic music, when in fact it is a positive one. Although it does not provide solid grounding for a singular methodology it does allow for many different perspectives on a particular work. For example, one analyst might choose to investigate pitch structures within an acousmatic work, whilst another analyst might try to demonstrate how an underlying narrative is communicated to the listener. Both analyses have merits and indeed offer different outlooks on the same work. As Nattiez (1990: 168) states "there is never only one valid musical analysis for a given work". The same concept can be applied to the different methodologies of analysis, which inevitably relate to the varying reasons for undertaking one. These different perspectives provide different insights to an audience and indeed other

¹¹ Although Smalley states that that spectromorphology is "intended to account for types of electroacoustic music" he does say that it is really intended for music that is "partly or wholly acousmatic" (Smalley 1997: 109).

analysts who might not have noticed aspects of a piece highlighted by another listener. These different insights can lead to disagreements of interpretation and understanding of a work, which can actually be beneficial to a community. In that respect an analysis can be considered a means of communicating a particular perspective of a work.

A question that should be raised at this point is: what is electroacoustic music analysis? Firstly, there is the potential problem with the scope of such a question. It should be noted that this thesis subscribes to Landy's (1999: 61) definition of electroacoustic music, which he outlines as "any music in which electricity has had some involvement in sound registration and/or production other than that of simple microphone recording or amplification". Considering this, the scope of electroacoustic analysis is expanded to other forms of electroacoustic works and not just those works that are considered to be acousmatic. This highlights the first problem; there have been many publications on the subject of analysis, within the field of acousmatic music. However, these methodologies and tools are not entirely applicable to other forms of electroacoustic music, such as installations, mixed music, live electronics, etc. Secondly, the classical definition of music analysis, provided above, does not lend itself easily to electroacoustic music analysis. The weight given to constituent elements (harmony, melody and rhythm) that define the musical structures raises problems for potential assimilation within the electroacoustic music domain. There is also hesitation from traditional music

analysts to validate and adapt the tool sets they have developed for electroacoustic music analysis.

[...] most theorists are reluctant to discuss these [electroacoustic] works, as well as the works of many contemporary acoustic composers, because without the security of a time signature most analyses are reduced to generalised discussions of pitch sets. Once the factor of pitch is removed, traditional analysis comes to a virtual halt (Frank 2001).

Certain electroacoustic musics, such as sound installations, add other parameters that are not necessarily explored with traditional tools. The biggest exclusion, which relates to a majority of electroacoustic musics, is the spatialisation of sound. There are clearly some parallels to be drawn from tonal music analysis, yet some alterations are needed to adapt these studies to the domain of electroacoustic music. Thirdly, the words used in traditional music analysis do not reflect the broadened array of material at the disposal of electroacoustic music composers, or even how one might use such material to create convincing musical structures. Concepts such as counterpoint and harmony (although applicable to electroacoustic works that employ pitched sounds) are no longer defining factors in the composition of musical discourse. Finally, the object of study has changed between classical instrumental music and electroacoustic music. Whereas the object of study for traditional Western music is the score (or the musical result of a performance of the score) the object of study of some electroacoustic musics (specifically acousmatic music) is the fixed media recording created at the end of the compositional process. The performance of this type of music does not require

an instrumentalist to interpret a score, but a diffuser who, through interpretation, can effectively expand the piece to larger spaces outside the studio environment within which it was created.

So, what has been done within this domain to counteract these potential problems? Like other musics electroacoustic music analyses employ either a formalised or a non-formalised analytical approach. Furthermore, Clozier (1996: 237) argues that there are two types of analysis: analysis at the time of listening (attention to the main points of the work) and analysis generated by multiple listenings (where the listener might hear details that can be overlooked within the listening flux). Attempts have been made by various scholars to provide experts with new terminology¹² to describe elements and concepts that are specific to the electroacoustic music genre in order to effectively undertake a written analysis. There have also been attempts by other academics to create analytical symbols to aid in electroacoustic music analysis, however these formalisations have been less prevalent. The majority of attention has been towards the development of a specialist language that, once defined, could not only aid in non-formalised analyses but also in defining a lexicon of terms. Nevertheless, there still is no consensus on the correct vocabulary within this domain. Even the term *electroacoustic music* is still contested, hence the necessity to define it within the

¹² Smalley's (1986 and 1997) *spectromorphology* and Emmerson's (1986) *language grid* are but two examples of this. Both of which will be explored in more detail in another section.

scope of this thesis. There are however three more approaches to the understanding of electroacoustic music that have not been discussed thus far. They are graphical transcriptions/representations and computer generated representations.

Graphical transcriptions (or representations) have existed not as an analytical tool, but a means to ground a work. Analysts sought a means to visualise an electroacoustic work in order to study its underlying structures in lieu of a fixed score.

Graphic transcription of a work has, since the earliest days of the electroacoustic genre, mitigated the absence of visual support of the music, which was the score for so-called 'written' music. However, transcriptions can have several functions, such as being used as a working draft, a basis for analysis, or even an object of analysis, a guide to interpretation, a pedagogic tool to help reveal the work to music lovers, and even provide a medium for working out creative ideas. It can also be used to memorise, and to preserve – like a score (Gayou 2006: 125).

Gayou (2006: 128) continues her commentary of the uses of a transcription by stating that the “transcription code”, developed as part of the transcription process, “must allow for plurality, insofar as the perception of relevant sonic events is likewise interpreted in different ways from one listener to another and even by the same listener during a single hearing”. This concept is continued by Nattiez, and subsequently applied by Roy (2003), who terms this an analysis of the neutral level, a level “whose poietic or esthetic aspects have been neutralised” (Nattiez 1990: 12). However, criticisms of representations are brought forward by Smalley

(1997: 108), who states that one must not put too much faith in representations as they “freeze the temporal experience of the music” in an attempt to counteract the “fleeting and selective nature of wayward aural attentiveness and memory during the sounding flow of music”. Clozier (1996: 236) counters this argument by stating:

[...] analysis cannot become effective until the public or the professional has listened to the work, has pulled back from it and is no longer under the spell of the musical performance. Moreover, this is dependent upon the number of times the work had been heard, and where: at home, at a concert, etc. Multiple rehearsals will influence practices and approaches, favourably or otherwise. They determine how and with what degree of exactingness [sic] a work is listened to, analysed, received and finally understood.

Graphical transcriptions have a clear use, particularly in acousmatic music where no visual traces are left from the compositional process¹³. Again, this can be viewed as the “falsification” of the music (Cook 1998: 71), yet this is a necessary compromise in order to make not only the analyst’s work easier, but also the reader’s ability to comprehend their findings. There are a few who state that transcriptions or representations are not analyses of musical works. However, Couprie (2004: 109) counteracts this claim by stating, “nowadays, analysis can be found on media such as the CD-ROM or the Internet, and the simultaneous combination of sound, graphics and texts is very common. In this context, graphical representation seems to constitute a real tool for analysis and for the publication of electroacoustic music: henceforth, analysis and representation will be inseparable.”

¹³ The composer might create their own visual representations of their work as part of the compositional process. However, this does not negate the potential usefulness of a graphical transcription created by an analyst.

When an analyst chooses to create a transcription they are, in effect, highlighting particular aspects of interest, which might not be readily noticeable by another listener. This new advent of technology that Couprie is referring to allows for readers of an analysis to investigate these notable aspects, defined by the analyst, in more detail with the music playing concurrently. Although this might seem to allow for exploration on the part of the reader they are still only viewing the work through a distinct perspective outlined by the aspects deemed relevant by the analyst.

It is not surprising that for an art form in which technology plays a fundamental role that a great deal of research has been devoted to the computer generated visualisation of this music. Examples of such visualisations consist of spectrograms, waveforms and Fast Fourier Transform (FFT) analysis. These types of representations have their use, but are often considered the end result of an analysis (albeit a computer analysis) and not an aid to an analytical investigation. “It must be said that although current methods of spectral investigation by FFT or automatic segmentation permit a certain illumination of the structure of acoustic textures, they remain considerably below the level of precision obtained by the careful reading of a traditional score” (Bossis 2006: 101). The criticism from Kramer above that many of the analysis journals focused on hermetic qualities is a criticism that can also be directed towards electroacoustic music analysis. A brief look at the field of electroacoustic music analysis unfortunately yields similar

results. Many of the electroacoustic music analysis studies seem to be fixated with the notion of grounding the work, specifically in these objective visualisations of the sound. Looking through the *Analytical Methods of Electroacoustic Music* (2006) book reveals this fascination with the physics of sound, as only a few of the authors actually attempt to discuss other aspects that relate to the genre. For an art form that eliminated the need for a score and promoted primacy of the ear it is often bizarre that many still consider algorithmically driven representations a substitute for aural-centric analysis. Giannakis (2006: 298) furthers this argument by expressing that computer representations are based on “low-level characteristics of sound, which bear no direct relationship to perceptual experiences”. These low-level representations (waveforms, sonograms etc.) do not aid in explaining a perceptual experience, rather, like a score, they have to omit certain elements of the work in order to be legible. In doing so aspects that might have related to a person’s perceptual experience might not be portrayed within the representation.

The critique of computer-aided analysis is necessary in defining the role and basis of music analysis. What computer-aided analysis represents is an objective way in which to analyse a work and thus only ever provides one perspective of it¹⁴. If we do truly hear a work with “different ears” (Schaeffer 1998: 13) then such a

¹⁴ Of course the parameters of the computer-aided analysis can vary, but the application of the same procedure will always give the same results when applied to the same material. However, the same work might not elicit the same emotional responses from a listener; thus, the question is how useful are these strict objective analyses when listeners’ responses can change between listenings?

representation does not take into account the many different ways (both in terms of perception and interpretation) a listener might form an understanding of a work. Only a human can effectively provide such a subjective understanding of a work. The aim would not be to provide a single perspective of a work, rather to communicate his or her unique perspective of it¹⁵.

There are, of course, critics of the idea of analysis within electroacoustic music domain. Boesch (1996: 229) states that analysis has value in only two situations: when involved in composition and when one seeks a more detailed perception of musical passage or phenomenon. This rudimentary definition of the knowledge acquisition within electroacoustic music does not take into account the vastly different circumstances surrounding the different electroacoustic music categories (as outlined above). Admittedly Boesch's focus is on acousmatic music, yet, even so, context of the work, specifically its performance, does not seem to factor in his delineation. Landy (2007: 145) provides, within his *co-hear-ence* model a tripartition for classification of what he terms *sound-based* musical works. The *co-hear-ence* model includes: the context of the work, aspects related to a work's creative practice and aspects relevant to the listening experience.

¹⁵ This concept will be explored in more detail in chapter 3.

2.2 Perception and meaning in music

Both musical perception and meaning have a direct correlation with one another within many musical studies investigated in this section. Music perception defines the fundamental link between mere *hearing* and *listening* and how we perceive and group individual sounds to create musical structures; whilst musical meaning demonstrates potential interpretations, be they: intended (by the composer) or personal; absolute or referential. Since these two fields are so dependent on one another it is hard to discuss them separately and effectively. Many scholars have attempted to provide all-embracing frameworks in order to explore these two different yet dependant fields.

2.2.1 Frameworks for musical perception and meaning

Clarke (2005a: 13) provides an example of a representation that discusses both musical perception and meaning (see Figure 1). The representation is a four-part partition of a listener's perception that ranges from acoustics, psychoacoustics to cognition whilst exploring the aesthetics and potential meaning within a work. It is almost identical to Schafer's "sound contexts" (1977: 148) in which he provides four basic headings: acoustics, psychoacoustics, semantics and aesthetics; in an attempt to demonstrate how sounds might provoke different aesthetic reactions

even when the three other categories remain the same¹⁶.

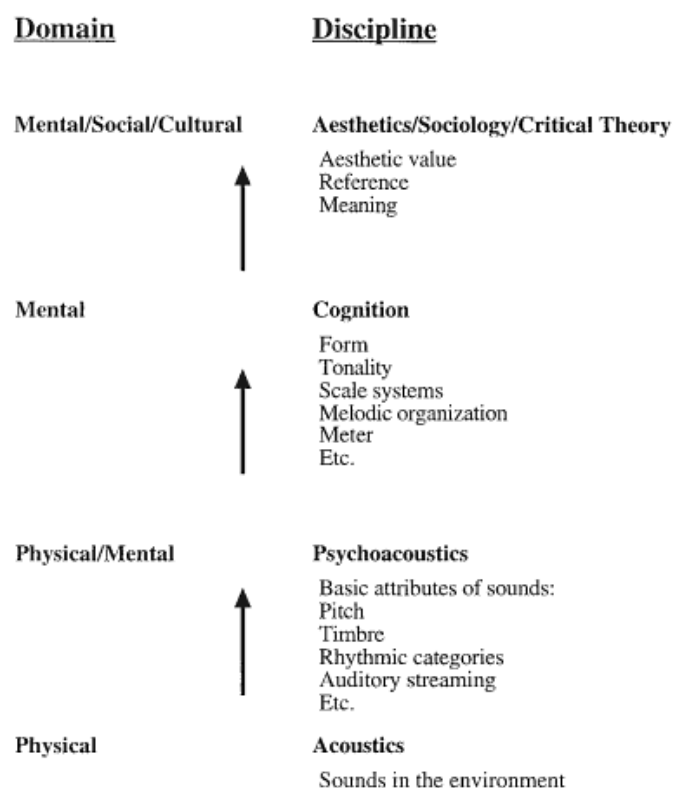


Figure 1. A representation of an information-processing approach to music perception taken from Clarke (2005a: 13).

Meaning, or interpretation in some cases, is shown to rest within either the semantic or the aesthetic divisions of each four-part partition (both of which could be argued to be the subjective sections of both frameworks, although this is not directly stated by either author). The differences between the two divisions presented above is that Schafer uses the semantic level, hinting that meaning is found in the associations one perceives upon recognising a sound event, and

¹⁶ Schafer (1977: 150) refers to such phenomena in music as “sound enigmas”, which he believes holds the key to understanding the “missing interfaces” between the four sound contexts he provides.

Clarke, because of its hierarchical manner, places meaning within the highest division of aesthetics. Schafer (1977: 150) also asserts that a listener's reaction, likes or dislikes, resides within the aesthetic segment within his sound context framework. The difference here is that Schafer puts a greater emphasis on source recognition as a separate perceptual quality rather than including it within the aesthetic division. These differences reflect the nature of how both of these scholars have come to this conclusion, specifically Schafer's focus on soundscape compositions.

Both scholars admit that these representations of both perception and meaning are simplified and that there exists a crossover between sections and indeed how one actually listens to a piece in real-time¹⁷. What this cross-comparison demonstrates is the great divide between scholars to where meaning resides, in relation to a framework for music. Clarke tries to clear up any confusion by providing this explanation:

Perception is the awareness of, and continuous adaptation to, the environment, and, on the basis of that general definition, the perception of musical meaning is therefore the awareness of meaning in music while listening to it. It can be distinguished from musical meaning that arises out of thinking about music, or reflecting on music, when not directly auditory engaged with music (Clarke 2005a: 4).

This division, between musical meaning encountered whilst listening to a piece and

¹⁷ In the listening flux one does not separate perception from potential meaning; they are inextricably linked.

the musical meaning that occurs by thinking about the piece after the event, causes a particular dilemma for analysis. If analysis is the falsification of music (as described by Cook in section 2.1.2), is one of the concessions ‘lived’ musical meaning¹⁸? This question will be discussed in section 2.2.3 with the three philosophies outlined within (semiotics, hermeneutics and phenomenology).

(3) & (4) ABSTRACT		(1) & (2) CONCRETE
because the object is stripped down to qualities which describe perception (3) or constitute a language, express a meaning (4).		because the causal references (1) and the raw sound data (2) are an inexhaustible concrete given.
(4) COMPREHENDING A meaning conveyed by SIGNS.	(1) LISTENING Events, causes, of which the sound is an INDEX.	(1) & (4) OBJECTIVE because we turn towards the object of perception.
(3) HEARING selected sound object by means of selective perception.	(2) PERCEIVING raw sound objects by means of raw perception.	(2) & (3) SUBJECTIVE because we turn towards the activity of the perceiving subject.

Figure 2. Table of Listening Functions taken from Schaeffer (1966: 116) and translated by Dack 2009.

Another element of perception and potential musical meaning, specifically within

¹⁸ ‘Lived’ musical meaning refers to the meanings that might arise upon listening to a piece for the first time. These are listener’s immediate responses to a work, before they have tried to understand the intentions of the composer or refined their own understanding through multiple listenings.

the domain of electroacoustic music, is the variety of listening modes that have been developed by numerous scholars¹⁹. Listening modes refer to our orientation of listening, specifically our attention to certain details and features within a work. Many of these listening modes originated from Schaeffer's *quatre écoutes* shown in Figure 2.

Arguably, one needs to be aware of the four-part frameworks presented above in order to assess his/her level of focus. *Perceiving*, in Schaeffer's terminology, means to hear passively and react to it if needed. *Listening* on the other hand shows an intention to the act of hearing in order to perceive a sound that interests us. *Hearing* denotes the listener's ability to discern certain qualities of sounds. Whilst *comprehending* refers to a listener's "comprehension of meaning through abstract values, a code, etc." (Chion 2009: 22 translated by Dack). On top of these Schaeffer (1966: 121) adds yet another four more listening orientations: ordinary listening (immediate focus on the causality of sound), specialist listening (focusing on particular sonic aspects of a sound), natural listening (to link sound to an event) and cultural listening (using sound to understand a message or meaning). However, the most important, in Schaeffer's *sofège*, was the reduced listening mode.

¹⁹ Delalande (1998) taxonomic, empathetic, figurativization, law of organisation, immersed and non-listening; Norman (1996) Referential and contextual listening; Smalley (1997) technological listening; Chion (2009) semantic listening.

Reduced listening is an act in which the listener attempts to remove any source recognition or meaning from a sound, which in turn creates the concept of a sound object (the smallest unit within the then termed *musique concrète*). Schaeffer's (1966: 268) sound object is therefore the opposite of Schafer's (1977: 131) sound event. Schaeffer's development of the sound object and reduced listening was his attempt to legitimise these new materials and compositional processes as a viable music genre. The problem with this is that it in fact overcomplicated what was for many people, whose musical experience and expectations were deeply rooted in Western traditions, a baffling new art form. Landy remarks, "although reduced listening might seem emancipatory in nature, it is hardly useful in terms of supporting either access to or the communication of meaning" (2006: 31). In more recent studies scholars have begun to include ideas concerning the immanent meaning surrounding real-world sounds used in musical works. Smalley's source bonding (1997: 110) is but one example.

2.2.2 Perception and the segmentation of music

It is clear that in both tonal and electroacoustic music the notion of segmentation, based on perception, from micro to macro elements of a work is an inherent part of music analysis. As conscious intelligent beings we organise sound materials within a work mentally in order to understand and interpret them as coherent musical objects. This is not only related to perception, but also our cognitive and memory

functions.

Snyder's book *Music and Memory: An introduction* (2000) is an investigation into how listeners comprehend music through their various memory faculties (both our ability to organise material into a coherent structure and our limitations of processing sounds). He presents a number of explanations as to why listeners *hear* sound in a certain way and why we choose to group certain material to create larger arching structures. The focus of his book is primarily on pitch-based music; however, there are many concepts (specifically auditory memory) that can be readily applied to the comprehension and understanding of electroacoustic musics. It is paramount that any framework dealing with electroacoustic music analysis takes these cognitive concepts into consideration in its development.

Our ability to assimilate music relates to our three basic memory states. Snyder (2000: 3) outlines three levels of memory: echoic (event fusion), short-term and long-term memory. These fields are not isolated and do cross over in many instances – short-term and long-term memory are two memory states that are processed simultaneously within one memory system (Snyder 2000: 9) – however their functions do differ:

Echoic memory and early processing provide our immediate experience of the present moment of music in the focus of conscious awareness, and help to segment it into manageable units; short-term memory establishes the continuity and discontinuity of that moment with the immediate past; and long-term memory provides the context that gives it

meaning, by relating the moment to a larger framework of ongoing experience and previous knowledge (Snyder 2000: 15).

Figure 3 provides further information relating to this tripartition of musical memory. Variations of this tripartition of sonic content can be found in many other publications²⁰, although it is unclear if the choices for such divisions are based on the limitations of memory or not. These divisions of sonic material can be summarised as: single sound events or notes; relationships between events to create groupings; and larger structures modelled from these into an overall form. However, this division is not as definite as other publications would imply. In fact, there are a number of other variables that affect our understanding of a musical work that impact on higher-level organisations.

Firstly, we are unable to absorb every element of a work in real-time. All listeners have memory mechanisms to prevent an overload of data, specifically in the temporal flux of listening to a piece of music. These include: gestalt principals, such as proximity, similarity and continuity (Snyder 2000: 39); higher-level groupings (intensification and parallelism) (Snyder 2000: 43); and personal knowledge of the piece or the syntax of a musical style (objective and subjective set) (Snyder 2000: 45). Furthermore, “chunking” events (Snyder 2000: 53), or groups of events, can aid in building larger structural significance in order to create a hierarchy within

²⁰ Schaeffer's (1966: 626) *les trois étages* and Park's (2010: 201) SQEMA methodology are but two examples.

musical material, which can lead a listener from the grouping level, to the phrase level and even to the sectional level of a work (Snyder 2000: 219). Although there is an interrelation between these three states there is still a hierarchy that dictates elements within the short-term memory structures can be grouped together to create micro and macro relations in the long-term memory.

Each of the three areas of this segmentation is formulated cognitively in different ways. It would therefore be beneficial to examine these more closely, starting with the sound events.

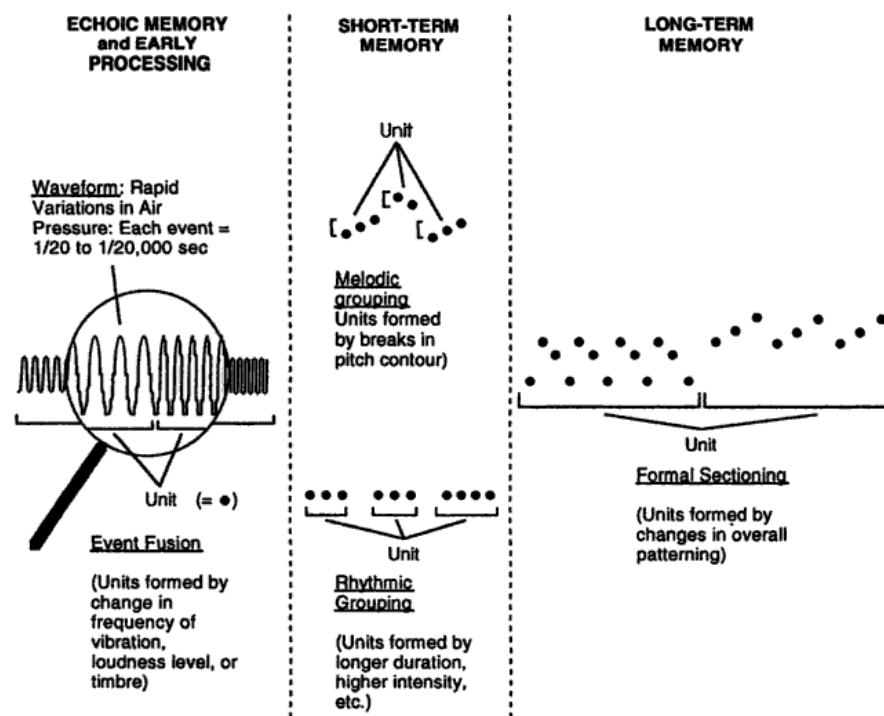


Figure 3. The levels of sequential grouping taken from (Snyder 2000: 350).

2.2.2.1 Sound events

Many scholars define sound events as the smallest conceivable unit in a musical structure. These events are made up of other constituent elements: amplitude, timbre, pitch etc. However, we do not segment a sound into these constituent elements, rather we hear it as one cohesion. Snyder (2000: 20) remarks that the “perceptual binding” of these constituent elements occurs within the early processing of sound in our brain. We can still hear these elements of a sound, but they cannot be removed from the cohesive event within which they exist²¹. Hence, as listeners, sound events are perceived as the smallest unit within works. There are of course boundaries that conclude events and divide events that sound in close proximity. Kendall provides a schema (Figure 4) for defining a sound event.

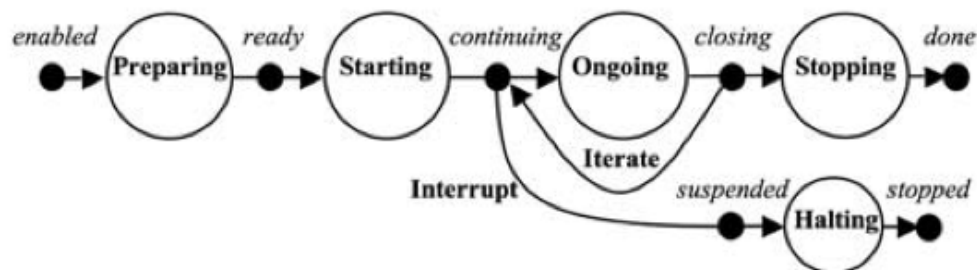


Figure 4. Event schema taken from (Kendall 2010: 66). Processes are represented as circles and states as dots.

Kendall’s diagram includes the idea of expectation²² and what he terms the “moment-to-moment experience” of music (Kendall 2010: 66) as he states “we are

²¹ Although their individual characteristics can be discussed within the context of the event itself.

²² Expectation in this instance is related to a person’s assumptions of what sonic content might occur based on previous sonic material within a work.

interested in events, not only in relation to the listener's understanding of single sounds, but also the understanding of groups of sounds and entire compositions" (Kendall 2010: 65). Rather than focusing on single sound entities the diagram considers how one sound might interact with others as well²³. Similar to (although not directly dealing with typology) Schaeffer's typology diagram²⁴ (1966: 459) Kendall's schema allows for iterative or sustained sounds. It also suggests that morphology (onset, continuant and termination (Smalley 1997: 115)) of the sound helps the listener separate one sound from another.

Memory, in relation to past musical events, is determined by what Kendall (2010: 66) terms *items*²⁵, which are bound to the event within the active mental space. This not only helps in perceiving individual sounds, but also in building relationships between discrete sound events.

2.2.2.2 Small and large musical structures

Grouping occurs in both short-term and long-term memory. The main difference between the two is that short-term structures tend to be innate and longer

²³ Kendall (2010: 66) refers to these immediate connections as "felt experience" and "flow dynamics" in relation to the various states a single sound might be taking in relation to other material. Another term for this is the temporal flux of music.

²⁴ Schaeffer's typo-morphology will be discussed in more detail in section 2.3.1.

²⁵ Kendall (2010: 66) makes a distinction between dynamic events, events that are still unfolding within the schema presented in figure 4, and past events, which are no longer evolving within the listener's mental space but are remembered through their characteristics, which Kendall defines as *items*.

structures are based on learnt schema (Bregman 1990: 38). Short-term structures are grouped sequentially (horizontally) or spectrally (vertically), which Bregman (1990: 9) and Snyder (2000: 143) refer to as “streaming”. “Streaming is responsible for our ability to hear several different kinds of sounds simultaneously and to identify them as coming from separate sources” (Synder 2000: 144). Although we are able to perceive these various streams of sound simultaneously we generally unable to listen directly to more than one pitch range at a time (Synder 2000: 144). Hence, there are certain limitations in our auditory memory which means, as listeners, we cannot fully *hear* a piece upon one listening, advocating multiple listenings in order to hear other elements within a piece. These methods of grouping sound events are based on gestalt theories. It is important to note that these short-term memory functions are involuntary. Conversely, if one wants to explore larger structures one must deliberately listen for them.

The focus of “schema-based memory” (Bregman 1990: 665) is centred on learnt patterns and sequences. This builds expectation for the listener, who through experience of that style of music anticipates how groups of sound events might interact to the point of a larger change in musical direction²⁶. The issue, in relation to electroacoustic music, is that the majority of these learnt expectations are based on what Snyder (2000: 196) refers to as the “primary parameters of music”: pitch

²⁶ It is through gaining this understanding of schemas that application of this knowledge, in the development of analytical tools or compositional theories, begins.

harmony and rhythm. He states (Snyder 2000: 236) that uncategorised events (noises, irregular rhythms etc.) cannot be grouped easily into patterns and that they become unique events altogether, devoid of any relation. However, he does state that “determined listeners” (Snyder 2000: 236) might be able to find schemas from within such musics. The point is that schemas have to be learnt prior in order to consciously group certain sound events together as a rhetoric. Clearly this is a problem for electroacoustic music as the primary parameters have changed from pitch, harmony or rhythm to secondary²⁷ and other parameters not considered by Snyder, such as spatialisation.

2.2.3 Interpretation, emotion and musical meaning

Meaning in music is a vehemently contested subject. There are many theories and philosophies surrounding meaning within music, which has lead to many different disciplines and attitudes to where this meaning stems from and how it might be explained and investigated. Electroacoustic music further complicates matters, as the inclusion of real-world sounds means that their recognisability might trigger certain emotions and feelings within the listener, which might be different between individual listeners because of their personal, or cultural, understanding of the sound in question. It is clear that there are certain ways in which we remember and

²⁷ Secondary parameters, as defined by Snyder (2000: 196), are “aspects of musical sound that cannot easily be divided up into very many clearly recognisable categories” (Snyder lists: loudness, tempo, duration, articulation, timbre, sonority, pitch range and number of sources).

group sounds (as discussed above), but that does not account for the vast differences of opinions as to what classifies 'good' or 'bad' music, or even the different interpretations and perceived meanings experienced by different listeners.

Within his book *Emotion and Meaning in Music* (1956) Meyer outlines two main schools of thought in musical meaning. These two divisions were: formalists (the belief that music understanding lied exclusively within the perception of musical structures, ignoring other potential extrinsic meaning)²⁸ and expressionists (that these same relationships are capable of exciting feelings and emotions in a listener). Meyer (1956: 3) goes on to further divide expressionists into two discrete categories: absolute expressionists (emotional meanings arise in response to music and that these exist without reference to extramusical world concepts); and referential expressionists (emotional expression is dependent upon an understanding of the referential content of music). Further on Meyer makes a distinction between emotions and mood. *Emotions* are “temporal and evanescent”, liable to change between listenings and affected by other external factors and therefore particularly unique to the listener; whereas *mood* refers to a general feeling of a work which is often “permanent and stable” (Meyer 1956: 7). “Much emotional behaviour, though habitual and hence seemingly automatic and natural, are actually learned” (Meyer 1956: 17). So similarly to schema-based sound

²⁸ The concept of formalist meaning would be based mainly on perception and cognition.

organisation emotions, as taken from Meyer's definition, are also learnt. He continues by stating that the most evocative musics are those that surprise the listener.

As soon as the unexpected, or for that matter the surprising, is experienced, the listener attempts to fit it into the general system of beliefs relevant to the style of the work [...] three things may happen: (1) The mind may suspend judgment, so to speak, trusting that what follows will clarify the meaning of the unexpected consequent. (2) If no clarification takes place, the mind may reject the whole stimulus and irritation will set in. (3) The expected consequent may be seen as a purposeful blunder. Whether the listener responds in the first or third manner will depend partly on the character of the piece, its mood or designative content (Meyer 1956: 29).

Musical expectation, it would seem, not only affects our perception, but also our emotional reactions to a work. Therefore, an understanding of one's social and cultural heritage would be important to discuss when conducting an aural analysis.

So how could one analyse the musical meaning within a given work? An answer might lie within the three theories surrounding meaning within music already stated above: semiotics, hermeneutics and phenomenology. Unfortunately these theories are not completely divorced from one another and many of the scholars use the others to exemplify the superiority of their chosen theory. We shall start with semiotics, as it is the one of the few disciplines to have considered the study of acousmatic music.

2.2.3.1 Semiotics and music

Semiotics is the study of music as a sign from which interpretations are made. In

its basic form it is a tripartition of the composer's intentions (poietics), the work itself (as a neutral level) and the listener's interpretation of the work (esthetics). Meaning comes from the interpretation of the listener and is not found as a hidden meaning within the work. "An object of any kind takes on meaning for an individual apprehending that object, as soon as that individual places the object in relation to areas of his lived experience – that is, in relation to a collection of other objects that belong to his or her experience of the world" (Nattiez 1990: 9). This, for Nattiez (1990: 17), was meant to oppose the archaic belief that the work (which was carefully constructed by the composer to do so) communicated its meaning to the listener through its formalistic nature. However, many composers have contested the work as a neutral level²⁹ as it insinuates that the work itself has no inherent meaning. Instead the meaning is either considered to be a part of the poietic process or the esthetic interpretation, depending on the perspective one adopts. "The meaning is not located in the musical object (the piece), nor is it exclusively in the mind of the human perceiver, but rather lies in the relationship between the two" (Milicevic 1998: 27). The two concepts that will be discussed below (hermeneutics and phenomenology) require the work to say something to the listener in order to form meaning.

²⁹ In this respect as a trace of that results from the poietic process (for acousmatic music this would be the finalised fixed-media composition). Nattiez (1990: 15) refers to this as the "material reality of the work".

Nattiez (1990: 140) states that there are six analytical situations³⁰ (immanent analysis, inductive poietics, external poietics, inductive esthetics, external esthetics and communication between all three levels) that an analyst might adopt in analysing a work. Nattiez does explain that the choice is not made by the type of work rather the analyst's decision in selecting the variables from the music (1990: 143). The outcome of such an activity also inevitably, in semiotic theory, leaves a trace, which needs to be interpreted once again by the readers.

2.2.3.2 Hermeneutics and music

Hermeneutics, or “open interpretation” as Kramer (2011: 2) refers to it, does not aim to “reproduce its premises but to produce something from them” (Kramer 2011: 2). Hermeneutics is, simply put, the study of interpretation and meaning, usually through messages. Kramer (2011: 7) refers to interpretation, in the hermeneutic sense, as putting “meaning into action”, suggesting that one must verbally communicate this interpretation, be it through speech or written text. The meaning then emerges from this text. He likens interpretation to a “reading” (Kramer 2011: 6), not only in the figurative sense, but also literally. As readers ourselves we must intervene when reading such texts to account for its understandable shortcomings in communicating this inferred meaning³¹. It is understandable that many have

³⁰ Roy (2003: 188) provides examples of electroacoustic analytical tools that focus on a specific situation.

³¹ Much like an instrumentalist must interpret a notational score to add nuance.

questioned such a need for this type of research, as it does not offer objective outcomes. Kramer's (2011: 12) argument is that interpretation is not an act of discovery, but an "act of performance".

Hermeneutic approaches assume that meaning in the larger sense is neither inherent in the object of interpretation nor constructible on the basis of meanings locally encoded in the object; interpretation entails the agency of an interpreter who is more than a decoder, even a creative one (Kramer 2011: 21).

In applying a hermeneutic approach to musical meaning one must concede that there will always be uncertainty in results. Unlike semiotics, which deals with the signs and potential codes, hermeneutics demands that the interpreter contextualises his/her understanding. "Semiotics explicates; hermeneutics implicates" (Kramer 2011: 21). However, it is important to note that Nattiez (1990: 161) considers hermeneutics a potential avenue of semiotic study, which specifically resides in one of his non-formalised analytical examples (previously discussed in section 1.1.1).

2.2.3.3 Phenomenology and music

Both hermeneutics and phenomenology, although different studies, are often combined together in other disciplines in what is known as hermeneutic phenomenology. Their application is similar but the goals of both philosophies, although compatible, focus on different aspects of meaning and interpretation. Phenomenology is the study of a person's experiences of a work through the

perception of the phenomena within music.

[...] 'phenomenological' refers to the study of the essential qualities of human experience. To study an experience phenomenologically means to gain an immediate awareness of that experience by stripping away everything that is not essential to it – things like conventional associations, purely contingent circumstances, and so forth (Cook 1994: 67).

In doing so it makes a distinction between objective reality and subjective experience. Like hermeneutics the outcome of such a study is usually a written description of the experience.

Ferrara (1984) provides a methodology in order to communicate a phenomenological experience of a work. The methodology requires the analyst to note his or her responses from a number of different perspectives³². First one must listen 'openly'³³, meaning that one must suspend ones assumptions and expectations, in order for the following dimensions: syntactic (sound materials), semantic (musical structures) and ontological to emerge (Ferrara 1984: 359). After these three dimensions of the piece have been investigated individually the analyst must again listen 'openly' to see which one "stands out in a conceptual, contrapuntal design of meaning-dimensions" (Ferrara 1984: 360). In doing so he attempts to ground the experience of open listening so that results from such an activity may be documented. Ferrara's process relates to, what has been termed in other disciplines that use phenomenology (such as psychology), as empirical

³² This methodology is applied to Trevor Wishart's work *Imago* (2002) in section 5.5.

³³ Also known as *bracketing* in psychology studies of phenomenology (Barker et al. 2002: 78).

phenomenology³⁴.

2.2.3.4 Electroacoustic music initiatives

There have been a number of investigations into interpretation, specifically by non-experienced listeners, to acousmatic works, comparing the results to the composer's initial intended meaning. One such investigation was the *Intention/Reception project* (Landy 2006; Weale 2005). The project demonstrated that neophyte listeners could have a deeper appreciation for electroacoustic music if they had "something to hold on to" (Landy 1994). This is not necessary for experienced listeners as their "domain-specific knowledge" enables them to "fill in the many blanks with default values" (Kendall 2010: 65). What is interesting about this study in particular is that the non-experienced listeners had better enjoyment and understanding once they were provided with poietic information documenting the pieces' composition or intended meaning.

³⁴ In attempting to create a *sofège* and *traité* for *musique concrète* Schaeffer was applying phenomenological theory "without realising it" (Chion 2009: 29).

2.3 Existing analytical tools for electroacoustic music analysis

It is important to get a sense of the current tools for analysing electroacoustic music. The word *tool* in this instance is not used to denote a software program (such as INA-GRM's Acousmographie³⁵ or EAnalysis), rather it is meant to signify analytical methodologies that can be applied, by a listener, to a work. The tools listed below will be discussed in more detail in section 4.2 where they will be applied and cross-examined within the electroacoustic toolbox.

The majority of tools covered in this section will be biased towards acousmatic music and other fixed media centric musics. Other electroacoustic art forms that employ other elements in their construction³⁶ have, at the moment of writing this thesis, little to no applicable analytical tools. This is because the focus of much of the research in these areas has been in the clarification of these elements, which often lead to cross-disciplinary investigations into audience participation and interaction. However, there is still potential for analytical tools to be developed.

2.3.1 Schaeffer's *Typo-morphology* (1966)

Typo-morphology is a potential tool for the analysis of acousmatic music, which was developed by Schaeffer as part of his opus *Traité des Objets Musicaux*. It is a

³⁵ <http://www.inagrm.com/accueil/outils/acousmographie>

³⁶ Such as site-specificity, live performance, interaction etc.

potential tool, as it does not directly state that it is only meant for analysis. In fact typo-morphology was a continuation of Schaeffer's attempt to validate the *musique concrète* art form and formed a major part of his *solfège*. The reason it has been included here is that it could potentially be applied to analytical investigations of acousmatic music, particularly those works of the *musique concrète* era.

Typo-morphology is split into two main areas: the typology and morphology of sounds. Chion (2009: 124) explains three main stages in applying typo-morphology to a work: identification (segmenting sound objects within a piece), classification (using the typological terms) and description (describing the sound's morphology in detail). Schaeffer (1966: 435) explains that there are fields (balanced and unbalanced) in defining a sound's typology. He then further defines these as either an impulse, sustained or iterative sounds. The culmination of these results can be found in the typology grid (Figure 5).

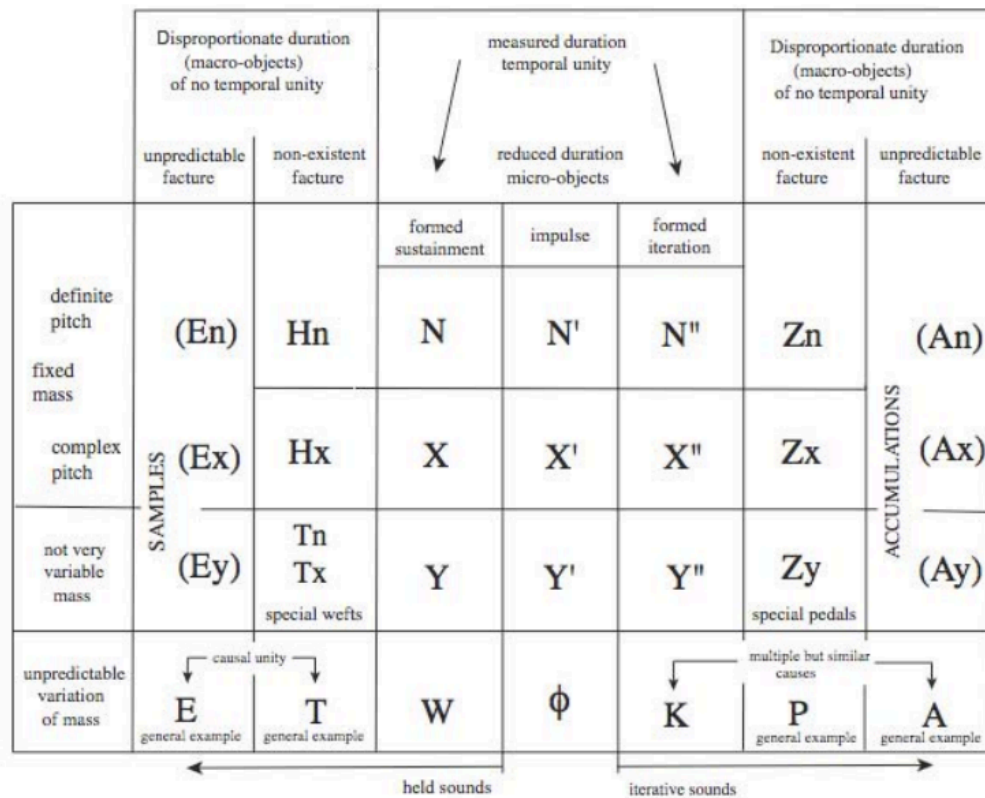


Figure 5. Schaeffer's typology grid taken from Schaeffer (1966: 459) and translated by Dack 2009.

The morphological framework for a sound is split into seven criteria: mass, harmonic, timbre, grain, allure, dynamic, melodic profile and mass profile (Schaeffer 1966: 584). All these terms are brought together within the *Summary diagram of the Theory of Musical Objects* (Figure 6). A distinction is made between sounds that contain *composed* (simultaneous) or *composite* (successive) elements (Schaeffer 1966: 464). These elements can be explained even further by employing the typological framework in order to denote their morphology through Schaeffer's typological formulas (1966: 466). Commas are used to note composite

elements and full stops for composed elements³⁷.

The main issue with typo-morphology is its dependence on the reader having a grasp of the entire *soflège* that Schaeffer established. One must have an understanding of reduced listening approach in order to apply the typological (and even the morphological) aspects of the tool. Furthermore, the outcome of such an activity does not necessarily mean it is comprehensible for potential readers. In a sense it becomes a specialist language. Thoresen (2007, 2009 and 2010) has constructed a notational system using Schaeffer's typo-morphology at its core. Although this is meant to make it easier to apply the tool to visual representations of a work it still requires specialist knowledge from the reader in order to understand what is being communicated³⁸.

³⁷ This is further described in the summary of the *Theory of Musical Objects* (Figure 6), which focuses on the typo-morphology recapitulation column.

³⁸ Lasse Thoresen's notation system requires that the analyst or reader have an understanding of Schaeffer's typo-morphology and the scoring symbols he has developed, meaning it is, once again, developed for specialists, both in its application and comprehension.

		1			1																
	<div>Description (2-3) Evaluation (4-9) of</div> <div>CRITERIA of musical perception</div>	TYPES typo-morphological recapitulation		<div>Description (2-3) Evaluation (4-9) of</div> <div>CRITERIA of musical perception</div>	TYPES typo-morphological recapitulation																
1	MASS	TONIC type N COMPLEX X VARIABLE Y OTHERS W, K, T	4	MELODIC PROFILE	<table><tr><td></td><td>Progress</td><td>Profile</td><td>Anam.</td></tr><tr><td>Fluc.</td><td>N, X</td><td>N, X</td><td>N', X'</td></tr><tr><td>Dev.</td><td>Y, T</td><td>Y, W</td><td>Y'</td></tr><tr><td>Mod.</td><td>G, P</td><td>G, M</td><td>K</td></tr></table>		Progress	Profile	Anam.	Fluc.	N, X	N, X	N', X'	Dev.	Y, T	Y, W	Y'	Mod.	G, P	G, M	K
	Progress	Profile	Anam.																		
Fluc.	N, X	N, X	N', X'																		
Dev.	Y, T	Y, W	Y'																		
Mod.	G, P	G, M	K																		
2	DYNAMIC	homogeneous H nil: iteratif Z weak: web N, X, T formed: note N, X, N', X' impulse N', X' cyclic Zk reiterated Ei accumulated A	5	MASS PROFILE	Typological development Fluc. N/X or X/N Dev. Y/W or W/Y Mod. G/W or W/G																
			6	GRAIN	Pure or mixed of <table><tr><td>resonance</td></tr><tr><td>friction</td></tr><tr><td>iteration</td></tr></table>	resonance	friction	iteration													
resonance																					
friction																					
iteration																					
3	HARMONIC TIMBRE	either: GLOBAL TIMBRE or: secondary timbre of masses masses M1 th1 M2 th2 M3 th3	7	ALLURE	Pure or mixed <table><tr><td>mechanical</td></tr><tr><td>living</td></tr><tr><td>natural</td></tr></table>	mechanical	living	natural													
mechanical																					
living																					
natural																					
				SUSTAINMENT																	

Figure 6. Schaeffer's typo-morphology recapitulation within the summary of the *Theory of Musical Objects* translated by Dack and taken from Chion (2009: 197-199).

2.3.2 Smalley's *Spectromorphology* (1986, 1997)

Spectromorphology, as described by Smalley (2010: 95), is a "collection of tools for describing sound shapes, structures, and relationships, and for thinking about certain semiotic aspects – potentially analysis of a kind". It is a glossary of terms

used in "describing and analysing the listening experience" (Smalley 1997: 107). There have been two major publications by Smalley on spectromorphology (in English) and these have changes in the framework. Therefore, the focus of this description will remain on the 1997 *Organised Sound* article. Spectromorphology has been adopted more readily than typo-morphology, as there is still no translation of Schaeffer's *Traité des Objets Musicaux*, although a translation of Chion's *Guide des Objets Sonores* by John Dack can be found on the ElectroAcoustic Resource Site (EARS) website³⁹.

As the name suggests spectromorphology is split into two main attributes of sound: spectra and morphology. The spectra framework is split into three main categories: *note/noise continuum*, the *occupancy of spectral space* and *spectral density*; whilst the morphology framework is split into: *onsets, continuants and terminations functions*, the *motion and growth processes*, *texture motion* and *behaviour*. Each of these categories provides a list of terminology to describe the listening experience. There is no notational application to undertake a formalised analysis (using Nattiez's definition), so any analysis that uses this tool needs to be non-formalised in nature (unless the author creates and applies a notation system themselves).

Spectromorphology is first and foremost a list of terms to describe the listening

³⁹ www.ears.dmu.ac.uk

experience. Smalley (2010: 92) states that it is a selection of viewpoints and tools for "speculating and imagining", which cannot be organised into a specific compositional or analytical action. As with typo-morphology, spectromorphology is not intended for inexperienced listeners, rather it is intended for specialists (Smalley 2010: 94).

2.3.3 Smalley's *Spatiomorphology* (1986, 1997)

Considered an extension of the spectromorphological framework, spatiomorphology provides a "defined grammar of localisation" (Smalley 1997: 122), one of the first and arguably the most definitive of its kind. Rather than have spatiomorphology as another criterion of spectromorphology Smalley (1997: 122) argues that he uses the term *spatiomorphology* "to highlight this special concentration on exploring spatial properties and spatial change, such that they constitute a different, even separate category of sonic experience", in which "spectromorphology becomes the medium through which space can be explored and experienced". It is considered an extension of spectromorphology since "spatial perception is inextricably bound up with spectromorphological content, and most listeners cannot easily appreciate space as an experience in itself" (Smalley 1997: 122), referring to the concept of "perceptual binding" that Snyder (2000: 20) mentioned in section 2.2.2.1.

Spatiomorphology is one of a few tools that actually tackle the use of spatialisation

in musical works, specifically acousmatic works. The framework is divided into two main areas: the listening space and the composed space. The listening space relates to the different positions a listener might have in relation to the "frontal image", whilst the composed space relates to how perceived sounds interact with internal spaces (sounds that have spectromorphologies that seems to enclose a space) or external spaces (where sounds reflect off surfaces other than the resonating body itself) (Smalley 1997: 122). There is potential to enlarge the scope of spatiomorphology to other electroacoustic art forms where space plays a fundamental role, such as sonic installations. This would involve expanding the vocabulary referring to external spaces to include concepts such as the acoustics of real spaces (specifically for site-specific installations) and speaker placement.

2.3.4 R.M Schafer's *Classification* (1977)

Schafer's classification system is described as a "cataloguing systems for sound" (Schafer 1977: 134). The classification system is split into four systems: classification of physical characteristics, classification according to referential aspects, classification according to aesthetic qualities and sound contexts (which have already been discussed in section 2.2.1). Each of these systems utilise a different methodology of notating the findings of the analyst. These range from diagrams to cards that a listener might use to note down information of the listening experience quickly.

Unlike typo-morphology, which requires the listener to ignore referential aspects of a sound through the reduced listening process, the classification system encourages analysts to document the references they perceive.

[Typo-morphology] may be useful for the detailed analysis of isolated sound objects, but I would like to suggest a modification of it which might help to render it more immediately useful for soundscape field work. The idea would be to have a card on which the salient information of a sound heard could be quickly notated to be compared with other sounds. In line with our desire to comprehend sounds as events as well as objects [...] (Schafer 1977: 134).

The tool is very useful for investigating soundscape compositions that use real-world referential sounds to evoke certain feelings and emotions within a listener. It is also particularly useful for other electroacoustic art forms that do not require a separation of sound from its real-world reference, on the part of the listener, in order to comprehend the composer's intentions.

2.3.5 Roy's *Grille fonctionnelle* (2003)

The *grille fonctionnelle* (or function matrix) is the first tool within this section that provides analysts with a notation system for defining how sound events and structures relate to one another, moving beyond the sound event level of the work⁴⁰. It presupposes that one applies their own methodology to define the sound events within a work⁴¹; therefore, a segmentation of the discrete sound events

⁴⁰ Arguably more so than Spectromohology. See section 4.2 for more information.

⁴¹ In his own analyses he does adopt the semiotic that focuses on the analysis of the neutral level of the work (Roy 2003: 201), the outcome of which is a transcription of the sound events within the work.

within a work needs to be undertaken before the notation can be applied. Once this has been done the analyst must then apply the notation for the functions on top of the score they have just created. Roy (2003: 340 translated by Gatt 2013) states that the functions are used to "conceptualise the role of musical units within a work" defined from the analysis of the neutral level. It may be obvious at this point, but Roy's implementation of the *grille fonctionnelle* is heavily influenced by Nattiez's work on semiotics within music.

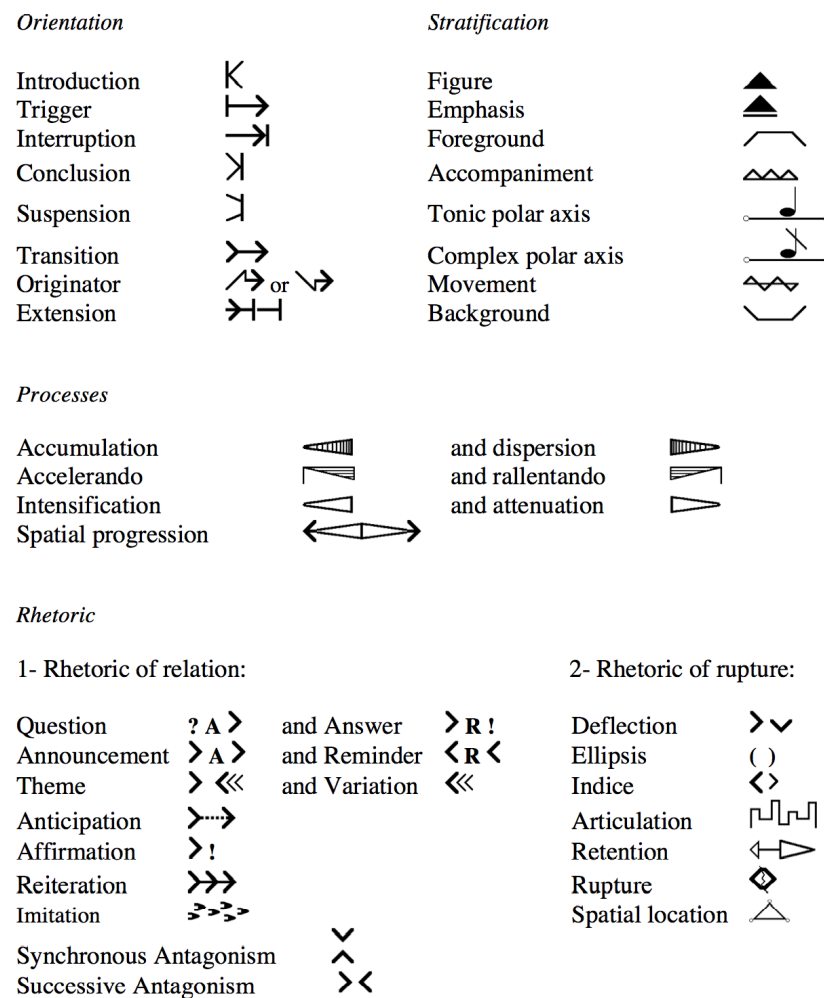


Figure 7. The functions within the *grille fonctionnelle* taken from (and translated by) Roy (2003: 342).

The framework is split into five main categories of functions: *orientation*, *stratification*, *processes*, and rhetorics of *relation* and *rupture*. Each of these categories house a set of symbols that can be applied on top of a transcription of a work in order to demonstrate relationships between highlighted sound events (see Figure 7). These symbols can be applied to multiple streams of sound and larger groupings of sound events as well (see section 5.5 for an example of its application).

2.3.6 Giomi and Ligabue's *Aesthetic-Cognitive Analysis* (1998)

The aesthetic-cognitive framework is a methodology for segmenting a piece into its sound events and musical structures. Once this is done the segmented units are put back together through synthesis in order to divulge meaning. Thus, the framework, simply put, is both an analysis and synthesis framework. It might appear that this is meant to be a universal methodology; however Giomi and Ligabue (1998: 122) specifically state that it is just an analytical methodology "which can take into consideration manifold aspects of the sound text".

The analysis framework splits the investigation into three areas: the formal level, structure level and syntagms. The results from which are then used in the synthesis section to investigate both compositional and significant strategies within the chosen work. Giomi and Ligabue (1998: 126) provide examples of how to

visualise with the use of listening cards (similar to Schafer's classification methodology) and graphical representations of both large and small structures.

What is different from other methodologies is that the aesthetic-cognitive framework starts from the level of form and works top-down towards smaller musical structures. It is also one of the first to attempt to investigate meaning surrounding a work and not just individual sound events.

2.3.7 Emmerson's *Language grid* (1986)

The language grid is a table developed by Emmerson to describe types of sonic material (referred to as syntax) and their musical discourse. It is, once again, concerned mainly with fixed-media musics. Rather than focusing on particular sound events or structures the language grid considers the piece in its entirety. It juxtaposes the syntax of sounds (abstract or abstracted) with the type of discourse (aural or mimetic), allowing for hybrids between the given antonym pairs, which creates nine sections within the language grid. Emmerson does stress that these compartments are only "arbitrary subdivisions of a continuous plane of possibilities" (Emmerson 1986: 25).

The grid can be used to classify how certain pieces use sonic materials (whether sounds are chosen systematically or because of their specific sonic qualities – top-down and bottom-up compositional strategies) and the musical discourse (be it

based on perceptual or referential structures) that is evoked. Like spectromorphology the language grid provides users with a selection of terms that can be applied to electroacoustic works. Analytically the language grid can be used to formally investigate the discourse and sonic material and could potential be applied along with another analytical tool that would investigate specific structural elements of the work.

2.4 Existing analyses of electroacoustic music

It would seem wise at this point to investigate some analyses of electroacoustic music. Much has already been discussed about the field of research, but so far no analyses of electroacoustic music have been examined. There are, of course, a number of analyses of electroacoustic music; however, this section will focus on particular analyses that demonstrate different methodologies and aims of analysis.

There are a lot more analyses of electroacoustic works, but to document them all would require an explanation for each methodology as well, since many of the analysts devise their own strategies specific to that composition. The aims of the analyses discussed below demonstrate that there are a number of different analytical methodologies. These methodologies are usually selected because they attempt to answer a specific analytical aim. The outcomes of such investigations also have different forms, ranging from written descriptions to interactive programs aimed at empowering the reader with the option to explore.

2.4.1 Wehinger's aural score of Ligeti's *Artikulation*

Wehinger's (1970) aural score of Ligeti's *Artikulation* (1958) is one of the most recognised analyses of electroacoustic music. Like many scores it segments sounds into types and demonstrates their relation with one another formalistically.

Wehinger segments the piece into four different categories: noise (which scales sounds from recognisable to unrecognisable pitch), harmonic and sub harmonic spectra, unfiltered impulse and filtered impulses (Wehinger 1970). Lines and background shading also indicate relationships between sounds.

As a listening score Wehinger's analysis functions very well in aiding listeners in navigating the vast array of sounds and provides a potential basis for further analysis⁴². However, it is no more than a listening score, as it doesn't say anything more about the piece other than identifying sound events and hinting at perceptual sound structures (which might ultimately be different for other listeners). There is no particular agenda that Wehinger is trying to portray; rather he is separating the sound components by their note-noise ratio, particularly in relation to harmonic material or clear singular notes. This is notated by three main symbols: noise symbols (ranging from white noise to filtered noise), harmonic material and single pitched notes. All of these symbols are colour coded and notated differently to reflect their characteristics⁴³. Hence, the score does not tackle the structures within the work, rather it hints at its potential form through the formation of notated sounds. That is not to say that Wehinger's aural score is in fact not an analysis, far

⁴² In that respect Wehinger's aural score is a neutral analysis of the "immanent configurations of the trace (the work)" (Nattiez 1990: 15).

⁴³ For example, a black block depicts white noise within the aural score, whilst harmonic material is notated by parallel horizontal lines that vary in colour depending on the proportion of perceptual noise.

from it, but it is important with all analyses to understand the aims⁴⁴. The aims of Wehinger's aural score were no more than to segment Ligeti's work and to communicate his findings to readers in order to aid them with their perception. It is clear in its aims and it does not deviate from this, which might be the reason why this particular analysis is referenced so much within other publications.

2.4.2 Ferrara's phenomenological analysis of Varèse's *Poème électronique*

Ferrara's (1984) analysis of *Poème électronique* (1958) by Edgard Varèse demonstrates how one might approach a piece from a phenomenological point of view. He uses the same methodology as described in section 2.2.3.3 to achieve this.

Instead of relating what one hears to schemas learnt through practice Ferrara steps back and allows for all thoughts and reactions to the piece emerge. The result is a completely honest and almost naïve account of a person's listening experience, which is unhampered by what is expected or what is considered musically 'right'. The analysis, in the traditional sense, only occurs after a number of open listenings, which happen to form the majority of conclusions made within the segmentation of the music. Unlike Wehinger's aural score Ferrara's

⁴⁴ That is to say Wehinger has highlighted certain sounds within the work by their characteristics that he has deemed important. Another analyst or listener might not give so much weight to these particular aspects and prefer to focus on other elements of the work. It is therefore ultimately Wehinger's personal perspective of the work, one that might not be shared by others.

phenomenological analysis is unashamedly personal, which offers a complete different and unique perspective of the piece. The interesting aspects of such an analysis is that there will undoubtedly be many different interpretations, but at the same time it is likely that common features will emerge. However, there are merits in Wehinger's aural score as it still allows the reader to have their own interpretation of the work, whilst provided a map of interesting sound events and musical passages that the listener might not have been aware of. Ferrara's methodology presents an analyst's distinct interpretation and would not allow for any potential variations in understandings.

2.4.3 Clarke's interactive aural analysis of Smalley's *Wind Chimes*

Clarke's (2010) analysis of Smalley's *Wind Chimes* (1987), although an aural analysis, aims at describing the work in a different way to Wehinger. Rather than just offer a description or a listening score Clarke provides a software application to accompany the written description. The software is intended to lessen the problems related to representing the "subtleties of acousmatic music" visually or verbally (Clarke 2010: 35), whilst providing the user the ability to interact with the music as well. This is not the first interactive aural analysis that Clarke has undertaken, as he has also published two other analyses using the same methodology and with similar listening software (Clarke 2005b and 2006).

As the name suggests the analysis is an association between the segmentation of

sounds and the listening experience. It draws upon spectromorphological concepts, but does not apply them literally, in order to describe the various aspects of the work (Clarke 2010: 37). Throughout the written description (which not only discusses the segmentation of the work, but also its history as well) Clarke makes reference to parts of the software accompaniment so that the reader can better understand potential aspects of the piece. The structure of the analysis is top-down as Clarke begins with the overall structure of the piece and then works down through the segmentation and categorisation of sounds. He also discusses the creative process, using some of Smalley's composition notes, and pitch relations with the work that Smalley himself did not "consciously" intend (Clarke 2010: 37).

Understanding the compositional process can also help develop an understanding of the creative choices that faces the composer and therefore give insight into the significance of the particular decisions that were made. It may also of course explain restrictions and reasons why the composer could not do certain things! (Clarke 2010: 43).

What is interesting is that instead of prescribing an analytical point of view through diagrams or words Clarke offers the reader the opportunity to listen and experiment with the work, specifically with the *sonic explorer* section of the software. In fact Clarke encourages readers to form their own conclusions and quotes other analyses of the same work as "alternative views" (Clarke 2010: 56) that are "healthy in stimulating thought about the work" (Clarke 2010: 36). With this software Clarke is also applying the "doing" that accompanies understanding that Schaeffer intended with his *solfège* (Couprie 2006: 122). Finally, Clarke is one of

the few analysts to include a description of how different versions of the same piece differ and how the system can account for this⁴⁵. This is particularly important for pieces in which major changes to content occur over different versions. Although not related to Clarke's interactive aural analysis different versions of the same work will occur when there is a performance or interactive aspect to the composition. There might be multiple recorded realisations of a performance for example, all following the same score but potentially vastly different in many fundamental aspects (such as the duration or the nuance added by the different performers). Different versions of the same fixed media work can also occur, such as the ones referred to in Clarke's research of acousmatic compositions. This is more prevalent for earlier electroacoustic works. For example, both *Dripsody* (1955) by Hugh Le Caine and *Étude aux chemins de fer* (1948) by Pierre Schaeffer have been listed or published with differing durations of around thirty seconds. Of course this is important for Clarke's research, but this also could potentially impact on the comprehension of another analysis. If, for example, a musicologist had undertaken an analysis of *Dripsody*, without stating which version he or she had analysed, the potential reader might use another version, which could possibly result in the reader misinterpreting the analysis.

⁴⁵ Clarke (2010: 48) provides a table documenting the differences in start times for three versions (1990, 1992 and 2004) of *Wind Chimes*.

2.4.4 Roy's functional and implicative analysis of Bayle's *Ombres Blanche*

What is of interest within Roy's analysis of Bayle's work *Théâtre d'Ombres* (1988) is that he does not analyse it in its entirety, rather he focuses on the first two sections of the *Ombres Blanche* movement. This is of particular interest since it demonstrates that one can focus on a particular section of a work, provided they make the reader aware of this and their reasons for choosing to do so. Before describing the analysis Roy gives his reasons for choosing to focus on these sections in particular, which, of course, happen to be related to his experience and interpretation of the work that, in turn, dictate his aims for the analysis. Having clear aims within an analytical investigation, as demonstrated by Roy, is extremely important for the reader. By dictating the scope of the investigation to a particular movement within a work the reader is completely aware of the limitations of the analysis and in doing so the analyst focuses their attention on what they want the reader to understand from their investigation.

Roy's focus is to not only to investigate sound events within the movement (which he accomplishes by making a listening score), but also the functions and relationships between these events. To highlight these relationships between sounds graphically he employs his *grille fonctionnelle* tool (as outlined in section

2.3.5) culminating in a listening score at the end of the analysis⁴⁶.

He makes a comment that a single sound event (or semantic unit as he terms it) can change “according to its location in the syntactic flow” (Roy 1998: 166). An important idea that reinforces the concept that analysis, the investigation and potential segmentation of a musical work, is the falsification of music. In the act of segmenting a work an analyst is removing certain sounds from the syntactic flow, which might elicit a specific understanding within the context of the work. Listening to these sounds singularly outside of a work might divorce it from its initial significance (as understood within the composition of the work in question) and potentially give rise to new interpretations when viewed separately.

⁴⁶ Roy’s focus is on the subjective perception of the work. The score is just “the first step of an analytical process and it attempts to show conveniently how the musical flow is segmented according to my own listening” (Roy 1999: 166). The implication is that there might be other scores that segment the musical flow according to an individual’s own listening, which itself might change depending on their particular focus at that time.

2.5 Chapter summary

It is clear there are some gaps within the field, specifically in relation to other forms of electroacoustic works and not just acousmatic compositions. More research is needed to define what elements of acousmatic analysis (and indeed instrumental music analysis) can be applied to other forms of electroacoustic music. One such area that needs further investigation is the spatialisation of sound; a fundamental part of many electroacoustic music performances.

Although many of the ideas brought forward in this chapter clearly have relevance to electroacoustic music there has not been enough empirical testing to define what are the important elements in listener's segmentation of an electroacoustic work. What is apparent however is that there are cognitive explanations as to why we group sonic materials together and that there is a generalised tripartition of these groupings that exists within both instrumental and electroacoustic music. What this introduction has shown is that there is an underlying framework for the segmentation and cognition of musical structures, which exists across both instrumental and acousmatic music. More needs to be done, however, in the development of schemas for electroacoustic music that might be applicable not only in analysis, but compositional theory as well.

This chapter was not meant to highlight a specific methodology for uncovering

meaning within a piece; it was meant to demonstrate that there are many ideas and concepts concerning this topic. It has been very hard to separate some of the concepts raised (specifically in relation to semiotics, hermeneutics and phenomenology), as a number of scholars believe that there is an overlap between studies of interpretation. What is clear is that the outcomes of applying such practices results in qualitative analyses, which generally require interpretation from the reader as well. Although the information included in such analyses is intended to be faithfully communicated to the reader they still need to interpret and make sense of the information presented before them. For formalistic analyses this is perhaps less prevalent and any misunderstandings would be due to a lack of clarity in the writing or graphical component of the analysis⁴⁷. For non-formalistic analyses the window for interpretation is much larger, specifically when Kramer (2011: 6) implies that the readers of such analyses are required to intervene when descriptive language is used to communicate an analyst's understanding. This interpretation spans not only to the interpretation of written analyses, but also the interpretation of visual analyses as well, specifically those that are evocative in nature.

There are however cases where similar meanings are found from people within close cultural proximity. This intersubjectivity often leads to the objectification of a

⁴⁷ Also the reader's knowledge of the formalistic methodology being applied would also impact on their understanding.

specific experience with a particular piece, what Meyer (1956: 7) terms as the “mood” of a piece. However, this objectivity is liable to change as Milicevic (1998: 27) points out: “[...] the human mind deals exclusively with subjective phenomena, and what we call objective is nothing but what most people agree to at the given historical moment using accepted scientific paradigms within a given sociocultural context”. As Schafer (1977: 137) states “no sound has objective meaning”; therefore, one could argue, that this rule applies to combinations of sounds as well. Ultimately we hear music differently and this is related to a number of different factors.

But everyone will finally have to admit that each one of us hears with different ears: sometimes too refined, sometimes too coarse, but in any event always <<informed>> by all kinds of prejudices and preconditioned by education. Ours is therefore an extension of the rudiments of musical theory through a radical renovation of it. (Schaeffer 1998:13)

It would seem that from the perspectives provided above and the theories provided, language is in fact the conveyor of musical meaning. Many of the concepts surrounding musical meaning have correlations to language, hence much of the lexis that encompasses musical meaning has a grounding in linguistics. This metaphor often causes confusion when the words are taken literally, specifically in the communication of ideas. Language is a rudimentary tool (as it always requires an interpreter to comprehend the message), but it is the closest we get to communicate our experiences and sensations with others.

All of the analytical tools listed within this chapter utilise language to some degree in order to either apply the tools or to metaphorically indicate how certain sections of the framework might be applied. It is clear that all these analytical tools are meant for professionals and provide little to no aids for new listeners of electroacoustic music. They also, unknowingly in some cases, apply many of the topics brought forward in the perception and meaning section of this chapter. There is clearly a direct correlation between how we hear, interpret and understand work and how we choose to analyse a particular piece.

There have been a number of different approaches to analysis demonstrated within section 2.3. These approaches can be summarised as either top-down or bottom-up. For example, Smalley's spectromorphology would be considered a bottom-up approach to analysis, since it concerns itself with identifying characteristics of a sound event and its immediate lower level functions within a work. Conversely, Clarke's methodology for his interactive aural analysis breaks the piece down from macro elements to discern the compositional processes undertaken by the composer(s). Roy's *grille fonctionnelle* is a unique case as it starts somewhere in the middle, considering both the lower functions of the work whilst hinting at larger formal aspects as well. What is apparent is that those methodologies or analytical tools that consider the work from the structural level tend to try to discern the underlying creative process behind a work; how it was created, potentially with the aim of re-synthesis as demonstrated by Clarke's work. In doing so top-down

analysis tend to presume a work's form and overall musical structuring, whereas those methodologies or analytical tools that start from the sound event level are more inclined to focus on how discrete elements function together to create musical structures. Choosing which is the most suitable will depend on the analyst's aims and intentions. However, this choice should be at the forefront of their mind before undertaking an analysis, since their aims and intentions might not be realisable with the available analytical tools⁴⁸.

Returning to the definition of analysis, as outlined in a section 2.1.1, we find that not only does one investigate the constituent elements of a work (or the sound events of a work) singularly, but also how these elements converge to create musical structures. It also demonstrated that there is clearly some connection between perception, memory, experience and meaning. Much of the research has provided some links to these fields of research. However, more investigation needs to be applied empirically within the electroacoustic field in order to gauge how one might communicate these findings to potential readers. Many of the founding tools for electroacoustic music analysis have been too fixated with defining the 'note' of electroacoustic music that they have not touched upon the musical relations they have with one another⁴⁹. Schaeffer (1966: 663), who received much criticism of his

⁴⁸ In this instance the analyst might choose to develop their own analytical tool that matches their analytical aims and intentions.

⁴⁹ A criticism that is echoed by Young (2009: 9) who argues "analytical tools that can unlock musical mechanisms in the various forms of electroacoustic music may not yet be fully identified".

work within *Traité des Objets Musicaux*, highlights this:

The main fault of this work [*Traité des Objets Musicaux*] is indeed that it remains the only one. More than six hundred pages on objects weigh down one side of the scales. To balance them out the author also ought to have produced a *Traité des Organisations Musicales* of equivalent weight. Would those who censure me be so good as to excuse me: I had neither the time nor the genius to embark on such a work, in a field where, furthermore, everything has yet to be done (translated by Gatt 2013).

Nattiez (1990: 94) agrees that this study only deals with “isolated sound-objects contemplated for their own sake, and not with sound objects integrated into a musical work”. Landy (2007: 137) concludes that because of the “emancipation” of electroacoustic music composers have somehow “lost [their] way” with respect to structure. It is only in more recent tools, spectromorphology, *grille fonctionnelle* and the aesthetic-cognitive analysis, that this issue has begun to be addressed.

The analyses discussed within this chapter not only show the vast differences in approaches one might take in order to analyse a work, but also the many different reasons one might require to do an analysis. The reasons for analysis might range from teaching to a means of communicating a meaning interpreted by a listener. As technology advances the possibilities of communicating findings from analytical investigations increases. Clarke’s (2010) analysis is one example of this.

3.0 Analysis of electroacoustic music

3.1 What is electroacoustic music analysis?

This chapter will address the issues related to the scope of electroacoustic music by investigating the different approaches needed to confront the various categories and their individual characteristics. Many of the concepts brought up in section 2.1 will be expanded upon here. In doing so this chapter will question what is needed to effectively analyse an electroacoustic work and discuss what the objects (what one is actually analysing) and objectives (the reasons for analysing) of study are and the correlation between the two. Furthermore it will investigate how the outcome of an analytical investigation is understood and received by the reader. This will culminate in a potentially universal procedure for electroacoustic music analysis that will encompass all methodologies of analysis and all the categories of electroacoustic music.

Before investigating these three concepts in more detail, and the procedure for electroacoustic music analysis, it would be beneficial to outline what analysis is within the context of this thesis. The definition devised within this section will have significance in later chapters. This chapter also acts as a midway sequitur, providing a bridge between the introduction/literature review (2.0) and the

electroacoustic toolbox chapter (4.0). The procedure for electroacoustic analysis will have significant implications on the electroacoustic toolbox, as it outlines many of the principle approaches to electroacoustic, and even traditional, music analysis.

3.1.1 What is music analysis?

The question of what music analysis is has already been touched upon to some extent in chapter 2; however it is important for the purposes of this thesis to examine what electroacoustic music analysis is and how it differs from traditional music analysis, specifically in the context of this thesis. Simply put, *analysis* is a process of investigation. This investigation is a critical examination of a chosen object; the outcome of which provides a perspective of the object in question. Because an analysis offers a specific perspective on an object it can never fully describe it, rather it is a single viewpoint of a potential multitude of others⁵⁰. As Nattiez (1990: 168) states there is “never only one valid musical analysis of a given work”. Bret Battey raised this concept within the first of three analysis symposia⁵¹ organised as part of the *New Multimedia Tools for Electroacoustic Music Analysis* project. Battey used the analogy of maps to explain what analysis is:

⁵⁰ This not only relates to the methodologies one might utilise to examine an object, but also the plethora of possible ways of communicating such an investigation. An analysis can only provide a perspective of a work regardless whether it is undertaken by a human agent or the outcome of a computer process.

⁵¹ The first analysis symposium was titled *Electroacoustic Music - What do we want and how might we get it?*

Analysis is always incomplete. Analysis is a map, it is not the territory. You chose different kinds of maps for a territory depending on what it is you are trying to achieve. One map helps you drive between towns; another map helps you find all the nice paths through fields; another map displays the different heights in a territory to help guide mineral exploration. You have to know what the map is for before you decide what has to be on that map. It is the most important question (Battey 2011).

When one embarks on an analytical examination of a chosen object he/she makes a conscious effort to create boundaries within which the analysis lies. Using Battey's example above a map is a conscious reduction of certain elements of an object of study in order for the outcome, the analysis, to be legible to the reader. Like a map an analysis cannot cover every single element of an object of study⁵². Rather than having one single map to depict everything we are presented with a selection of maps that can be cross-referenced with one another to give different viewpoints. What dictates the scope of analysis is often related to the reasons for conducting such an investigation – the objectives of study. The result of such an investigation – be it written, visual or multimedia – are a means to make the information that an analyst has deemed relevant coherent to a reader. An analysis, in this sense, is a means to communicate an understanding of an object of study.

The outcome of a musical analysis can give rise to in a number of different results. Hugill (2012a: 234-236) outlines five types of analysis within music: *parametric analysis*, which is, usually, a graphic representation of sound events within a piece;

⁵² To do so would diminish the reason for analysing outlined by Cook in section 2.1.1 where he suggests that an aim of analysis is to simplify the music (1994: 24).

affective analysis, which focuses on the subjective responses of listeners and the ways a musical work achieves this; *comparative analysis*, which, as the name suggest, is a comparison of two or more pieces of music; *genetic analysis*, which focuses on the compositional processes in making the work (this usually involves the analyst having access to poetical materials of the work); and finally *practical analysis*, which links to the notions of reflective practice and critical engagement. All of these outcomes are dependent on what the objectives of study are. For example, if an analyst wants to investigate the reception of the work then they would probably not undertake a parametric analysis of it. Instead they would most likely exercise another analytical approach that would reference the creational methodology behind the work, such as genetic analysis, or (if possible) they might gain qualitative data through questionnaires from people who have experienced the work within fixed parameters⁵³. Similarly if the analyst wants to explore the composer's intentions then they would more than likely opt for a genetic analysis over the other examples. The point is that the reasons for analysing a work, the objectives of study, dictate the possible outcomes of an analytical investigation. It should be mentioned that these archetypes are not self-contained methodologies and that an analysis might be a comparative analysis on genetic qualities of separate works.

⁵³ Delalande's work (1998) and the Intention Reception project (Landy 2006; Weale 2005) are but two examples of gaining qualitative data from listeners.

It is the contention of this thesis that analysis is not limited to the communication of a perspective through textual, graphical or multimedia. Analysis is an activity that all subjects of a musical experience do when thinking, talking and even when composing a work. As soon as one begins to question something regarding a passage within a work (or how certain sounds might work together when composing) one is critically examining and segmenting the music, which is analysis. If they choose to communicate this activity with others then this becomes an analysis of an object of study – a perspective. If analysis is ‘making sense’ of a piece of music then this is an activity that all listeners, regardless of their expertise, do when discussing a performance they have just witnessed with other audience members.

3.1.2 Differences between electroacoustic music analysis and notational music

So what is the difference between traditional music analysis and electroacoustic music analysis? Firstly, it should be stated that the aims of both activities could be considered the same; they both aim to demonstrate how the music they are investigating works, formalistically or emotionally. Such an investigation can be split into three discrete types of perspectives as outlined by Delalande. “The objective of music analysis is to bring to light configurations which either reflect the choices (implicit or explicit) and actions of the composer, or which are needed to explain the reception behaviours of listeners, or both at once” (Delalande 1998:

18). Where traditional music analysis and electroacoustic music analysis differ is in the actual sonic content that they use and how sonic events relate with one another to create musical passages. The languages, or indeed rhetoric, with which these two art forms function is partially different. That is to say that electroacoustic musics can adopt elements of traditional music, such as melody, harmony and rhythm. However, generally speaking, the focus is more often than not on other elements not explicitly utilised in traditional musics, such as spatialisation⁵⁴. All music is “organised sound” (Varèse 1966: 18); however, electroacoustic music, by its very nature, can encompass any and all sounds. Because of this there are no set systems within which composers have to work. Rather than dealing with abstract notational systems (which for many traditional musics becomes the object of study) electroacoustic composers have the ability to work directly with sounds, altering and manipulating them beyond their initial features⁵⁵. This causes a problem for analysis, as there is no precedent tradition. “The difficulties that are faced by analysts of [electroacoustic] music therefore include establishing typologies of sound and standardised analytical terminologies and procedures, through to identifying common musical languages or sets of shared practices” (Hugill 2012a: 233). Unlike traditional instrumental music electroacoustic music “presents no score, no system, and no ‘pre-segmented’ discrete units like notes”

⁵⁴ Often composers refer to gestures and textures when describing musical composition.

⁵⁵ Of course traditional notated music still needs to be realised by the instrumentalist(s). Hence there are possibilities to interpret a piece differently through nuance and orchestration. If one considers the potential for extended instrumental techniques then the notation might be even less precise.

(Delalande 1998: 14); “the analyst, deprived of any score which purports to represent salient features of the musical materials, is forced not only to consider which aspects of these materials are pertinent to an analysis, but must also contemplate the very basis and process of analysis” (Camilleri and Smalley 1998: 3). Therefore, analysts have to either interpret and implement another scholar’s strategies or methodologies or devise their own in order to examine the electroacoustic work in question. Roy states that this is a possible reason that there is a lack of interest within the field:

The lack of interest in the analysis of electroacoustic music is perhaps due to the fact that the legitimacy of the analytical approach has yet to be defined, while there exists many means to analyse tonal music. [...] Moreover, while it is exciting to analyse a work holistically, through a system of music that transcends the individuality of each piece, electroacoustic music, as acousmatic music, is not characterised by a language (2003: 43 translated by Gatt 2013).

Roy’s comment touches upon a lack of comfort among traditional music analysts, who perhaps have depended on formalised analytical methodologies that only require an analyst to apply them correctly. With no discernable underlying universal musical language within electroacoustic music these types of analytical methodologies become impractical, especially in those electroacoustic works where pitch, rhythm and melody are not the focal point, or if of any significance at all.

As there is no set methodology for analysing electroacoustic music⁵⁶ much of the work within this field is often based on subjective assumptions, which either deal with the composer's compositional techniques and consequent intentions, the potential listener's interpretation or both⁵⁷. These assumptions can be backed by empirical research into the composer's documentation (genetic analysis) or investigated through listener feedback (affective analysis) to provide qualitative responses to a work. However, the outcome is always a perspective and not a definitive understanding of the work in question. The analyst must ensure that the reason for the choice of perspective they are promoting is transparent for the reader. This can be addressed by following a strict guideline for how to conduct an analysis in the broadest sense – a process of analysis.

3.1.3 The process of analysis

The word analysis, particularly in the domain of music analysis, is, like the term electroacoustic music, often used to communicate different things. There are three ways to view the word: as the act of analysis itself (the examination and subsequent investigation of an object of study); as the entire process of analysis; or the outcome of an analytical investigation (i.e. the end result of the action). The process of analysis incorporates the act of analysis, but includes other steps in

⁵⁶ Of course the same could be said for classic instrumental music. However, there are a larger number of formalistic approaches to its analysis, such as Schenkerian analysis, which cannot be easily applied to electroacoustic works, specifically those that do not use pitch or harmony as major compositional elements.

⁵⁷ These perspectives are taken from Delalande (1998: 15).

order to complete the process. Throughout this thesis the term *analysis* will be used to refer to either the process of analysis, or to name an outcome of such a process. When referring to the act of analysis the term *analytical investigation* will be used instead to avoid confusion.

So what is the process of analysis? Well, an analysis starts with a question, or even a belief, a hypothesis. This question has a fundamental impact on the outcome of the actual activity. The question dictates to some extent the scope of the investigation and in doing so ensures that the focus remains fixed on certain aspects of the work. It is at this point that the analyst decides which of the three types of perspectives they wish to investigate, be it production, reception or both. For this reason it is extremely important to have a goal before analysing a work of music. That goal, in this instance, can be a question one might have of the work. The question one asks before conducting an analysis is the objective(s) of study⁵⁸. One might have more than one question regarding the piece that could provide more than one perspective of the work, or a single question that might be multifaceted.

Once an analyst has decided upon a particular question they can then begin the actual act of analysis. This stage of the process of analysis is termed the

⁵⁸ This concept will be explored in more detail in the subsequent section.

investigation. Obviously the question one is asking has a major impact on the method of investigation and indeed the elements on which the analyst chooses to focus. Delalande refers to these elements as *pertinences*; aspects of a piece that are emphasised by the question one poses:

Once an analytical objective is chosen it becomes possible to define a criterion of pertinence. [...] the concept of "pertinence" is linked to that of "point-of-view". A characteristic is pertinent from a certain point-of-view when it permits the description of an object considered from that particular point-of-view (Delalande 1998: 19).

The perspective (or point-of-view as Delalande refers to it), which is decided upon within the question stage of analysis, moulds and shapes the subsequent investigation section. It focuses the analyst's ears from simply listening to a piece to listening out for certain aspects related to one's goal. "In trying to analyse electroacoustic music aurally there is always the fundamental problem of uncovering pertinent criteria. What I find depends on what I hear, what I strain to hear, what I choose to hear" (Smalley 1992: 433). The analyst then breaks the work down into these pertinent elements in order to satisfy the question they are posing.

The final stage of the analytical process is to form coherence. In this stage the analyst attempts to communicate their findings to the potential readers. This section is the synthesis of the investigation, bringing together all the necessary information obtained. In doing so the analyst omits certain elements in order to

ensure that the analysis is comprehensible to the reader. Often the actual outcome is devised as part of the investigation stage of the process, as the analyst is in fact constantly trying to make sense of the work. In doing so they contextualise their thoughts and ideas through writing, images, diagrams and/or multimedia.

This rather simplistic procedure of *to question – to investigate – to form coherence* provides a brief overview of the analytical process. However, because of its generality it can encompass any conceivable type of analysis, whilst providing a framework for analysts to work within. It should be mentioned that this is a not linear trajectory and often the investigation produces more questions than answers. The choice of whether to pursue these new questions is up to the discretion of the analyst.

3.1.4 Criticisms of electroacoustic music analysis

The concept of music analysis, and indeed electroacoustic music analysis, is not without its critics. Many electroacoustic pioneers have been concerned with the regimentation of sound events and their musical structures, which to some seems to limit the scope of expression within the music. One such pioneer was Varèse:

[Electroacoustic composers] are also lucky so far in not being hampered by esthetic codification – at least not yet! But I am afraid it will not be long before some musical mortician begins embalming electronic music in rules (1966: 18).

Analysis is, by no means, the esthetic codification of the entire electroacoustic

corpus, since an analyst can only offer his or her perspective(s) on a work. An analyst is not able to mandate a classification system on a particular work since they are not the ones creating it. It is in fact the job of the composer to group the sound events into musical structures; therefore they are the ones who have dictated – because of taste, preference, narrative, aesthetic judgment etc. – how these sounds should ‘work’ together. The best the analyst can do is to try to understand the groupings of sounds in order to investigate the work. This comprehension of the groupings of sound might originate within the composition of the work, or through an understanding of similar works use of musical material.

Other scholars have questioned the need for analysis in its entirety:

I am not convinced that fully understanding any work of art could really be enhanced even by extensive analysis. The sublime mysteries and spiritual essence of art can probably never be revealed in this way. At best, all we get is the answers to the questions we asked (Bodin 1996: 222).

Bodin’s claim that experience and the sublime mysteries of the artwork cannot be revealed through analysis is completely correct, but that does not mean analysis should be discounted for that reason. Analysis, by its very nature, can only answer the questions one poses. It is a reductionist approach to understanding and therefore cannot fully describe the experience; however, it can investigate elements of it. By offering different perspectives one might start to get a general sense of the work. This understanding, if conducted by a single analyst, will always

be his or her interpretation of the salient features of the work and therefore cannot account for the vast possible understandings of the masses. If the focus of an investigation is on the intentions and compositional techniques of the composer(s) then the analyst might use compositional documentation to confirm what the intended essence of the work might be. Whether this is what a listener interprets is another story.

3.2 The objectives of study

The question of why one analyses a work is something that is often overlooked. It is in fact the most important aspect of an analysis, as it ensures that the rationale for undertaking one is comprehensive and comprehensible. The chosen objectives of study provide focus to what could potentially be a never-ending endeavour. This focus is fundamental to the success of the analysis. Without it the scope and depth of the investigation are not defined, which can lead to outcomes which are unintelligible and that say very little about the work, or indeed too much about a work.

There are a multitude of reasons for why one would choose to analyse an electroacoustic work. For example one might wish to:

- examine the compositional methodologies and strategies adopted by the composer;
- investigate whether the work is effective in what it is trying to achieve;
- communicate an interpretation of a work;
- uncover an intended interpretation of a work;
- communicate how a work makes one feel, or an audience feel;
- examine a specific performance of a work;
- examine the work as part of a corpus of other works;
- reference the work with other opposing categories of electroacoustic music;

- reference the work with musics not considered to be in the domain of electroacoustic music;
- use it as a pedagogical tool.

These are just some examples, which span the three types of analysis (production, reception or both) that Delalande stated in the previous section. The chosen focus therefore requires an analyst to adopt certain strategies and perspectives in order to view the work in a certain way.

3.2.1 The categories of production, reception and both

The choice of which perspective an analyst might decide to focus upon often relates to their specific role. Composers, for example, might want to investigate the compositional methods of another composer, or they might want to investigate the reception of their own work with audience members. This would be particularly useful for composers who wish to refine and improve their compositional techniques. Musicologists might choose to investigate a corpus of works with one another in order to gain a better understanding of the relationship between similar or even dissimilar works. A student, who might have been tasked with an analytical assignment, might be required to undertake an analytical investigation as part of their studies. Finally, there is the music enthusiast who might simply want to explore a particular work in order to gain a better 'sense' of why they enjoy it. Of course none of the above mentioned groups are bound by the general reasons listed since a composer, for example, could also be a musicologist, a student and

indeed an enthusiast. The point is that, generally, certain groups within the electroacoustic music community have certain goals when they decide to undertake an analysis. These aims are usually defined by the intentions behind such an endeavour, meaning that a composer can act like a musicologist if they wish to investigate a work (or even his or her own work) from a different perspective.

There are some fundamental differences in the approaches one might adopt when focusing on the work in a certain way. These differences in approach are related to the specific question one is posing. If, for example, an analyst questions a particular sound transformation technology used by a composer then their focus will undoubtedly be on the composer's intentions. However, they might also choose to investigate the reception of this particular technique.

It should be stated that although it might seem that this section is following a semiotic model, it is not proposing that this is the only way in which one might analyse or view an analysis of a musical work, on the contrary in fact. The potential perspectives concerning the objectives of study are focused on the viewpoints one might adopt when investigating a work. This means that an analyst makes a choice about what they are focusing on within the *to question* stage of the procedure. The questions are the fundamental starting point for any analytical investigation. The reasons for undertaking an analysis should not be overlooked as they have a

knock-on effect on the investigation and the final form that the analysis might take. It just so happens that there are only three viewpoints one could adopt when analysing a work⁵⁹.

3.2.1.1 Production

Production can be divided into two main elements: techniques and intentions. An analytical investigation that focuses on the production of an electroacoustic work might simply be an exploration of the techniques used by the composer, or an analysis of the aims of the composition. There is of course a tangible link between both, as the compositional techniques adopted by the composer are usually based on compositional intentions. Analysing the production of an electroacoustic work is somewhat problematic, as many of the answers to such questions are not inherently obvious from just the piece itself and might require further information through an investigation of the documents (both written and digital artefacts of the creational process) or dramaturges of the composer. However, gaining access to this material may not always be as straightforward as one might hope: not all composers want their compositional techniques to be known⁶⁰. There are of course

⁵⁹ Production, reception or both.

⁶⁰ Having worked within a European wide digital archive project I dealt with composers who were donating works to be archived. There were a few occasions whilst working with these composers when I was asked not to archive certain files that bore no relation to the final work. These files were what one could term experiments in sound recording and manipulation that were deemed unsuitable once the work reached its final form. It seemed that some composers did not want these trials and errors to be accessible to the wider public; rather they wanted to present their compositional process as an uninterrupted genesis.

exceptions to this, with composers, such as Trevor Wishart with his book *Sound Composition* (2012), providing great insight into their compositional choices and sound transformation processes.

One of the possible aims of an electroacoustic composer is to suspend the disbelief of the audience by producing otherworldly environments in which both abstract and real-world sounds might coexist. Within these environments a composer is able to create their own layers of realism that maintain this suspension of disbelief by providing listeners with factors to hold on to⁶¹, in an attempt to convince the listener that the sounds and their interactions are plausible. Musical analysis works at cross-purposes to this endeavour as an analyst, who is investigating the production of a piece, attempts to unravel the secrets of how the work achieves this suspension of disbelief; something which some composers do not appreciate. Like a magician who wants to keep their trade secrets confidential⁶² an electroacoustic composer generally does not want the listener to know which particular tools (be it particular plugins or max patches etc.) they are using, or their implementation in creating the final work. Composers want you to listen and enjoy

⁶¹ Landy (1994: 52) outlines four main something to hold on to factors: *parameters, homogeneity of sound and the search for new sounds, textures* (not exceeding four sound types at once) and *programmes*.

⁶² In order to maintain this illusion of a mastery of magic beyond our comprehension as audience members.

and not question the music; analysts want to ‘make sense’ of it⁶³. This is obviously not necessarily applicable in the case of all listeners, as they themselves might have knowledge of the ways in which a composer could create these enticing environments⁶⁴. In this instance the focus of the listener switches from admiration to respect of the composer’s handling of his/her materials and craft. Listeners might be able to discern compositional techniques through specialist knowledge (or even insider knowledge) and/or musical intuition. Unless definitive evidence is presented to the listener they are forced to use their instinct and intuition when analysing the composer’s techniques or intentions. This of course is not a problem, as the lack of esthetic information will encourage new unique perspectives on a work that will not be influenced by the composer’s intentions.

Sufficient knowledge of the compositional process provides some indication of the techniques adopted by a composer, however the analyst must listen out for certain indications of the tools and techniques utilised within the work. Smalley (1997: 109) refers to this type of listening as “technological listening”, something that he argues blocks the “true musical meaning” of a work. Provided that the analyst is aware of the change in focus this technique can be an invaluable tool in decoding a composition, especially if there is limited documentation of the actual tools used

⁶³ Analysts can still of course enjoy the music they are analysing and perhaps gain a better appreciation of the work.

⁶⁴ The irony is that frequently many of the audience members, specifically in acousmatic concerts, are composers themselves, or have a good knowledge of the art form itself.

within the compositional process. An analyst must be wary, as without evidence to support claims of the compositional process the conclusions they formulate will be conjecture.

There is an issue however as some qualities deemed relevant by an analyst might not have been ultimately defined by the composer. For example, decisions to construct the work might have been decided upon because of some subconscious choice (take the example from section 2.4.3 of Clarke's interactive aural analysis of Smalley's *Wind Chimes*). Needless to say these unconscious or subconscious decisions might help to provide some form of framework to differentiate categories of electroacoustic works. Emmerson (1989: 139) states that "measures of the composer's unconscious decisions may allow more penetrating generalities about the nature of composition compared to what we know may have been acquired consciously by the composer through learning (even fashion)".

3.2.1.2 Reception

When investigating the reception of an electroacoustic work an analyst is dealing with the potential understandings and interpretations a listener might have. This can be their own personal reflection, the combined understanding of an audiences' reaction to a work, or the assumption of how audience members might interpret the work. Reception of electroacoustic works can be split into three sections: qualitative responses, cognition and perception theory (which sometimes includes

speculation) and non-formalised analysis.

If an analyst wants to investigate audience interaction then they might want to adopt one of the many initiatives touched upon in section 2.2.3.4. Like any analytical investigation these studies require a question, which then helps narrow the field of potential participants, be it based on audience members with knowledge of the music or not. Many of the questions raised in these initiatives already discussed earlier explore an audiences' interpretation of a work and/or their appreciation of the music in general. Similar methodologies could be implemented in a more general way in order to provide qualitative feedback on an audience member's listening experience. The questions one poses to the listeners is of particular importance, as these will have a substantial impact on their particular responses, for example leading or ambiguous questions.

If there is no means of investigating actual listening responses then analysts might take it upon themselves to make assumptions of how an audience might interpret a work⁶⁵. There are many ways an analyst might undertake a generalised reception of a work. For example, they might employ a "taxonomic" listening approach (Delalande 1998: 26) to highlight how a listener might group certain sound events

⁶⁵ If the analyst wants to gain listener responses surrounding a work then they might want to investigate the other possibilities that do not require all the participants to be in the same place at the same time, such as crowdsourcing.

into musical structures within a piece. This listening method is the antithesis of technological listening previously discussed. However, like technological listening, this methodology is only a means to form conjecture and is ultimately still the perception of the analyst. If the analyst wants to focus more on the theoretical cognition of a listener then they might employ some of Bregman's work on *Auditory Scene Analysis* (1993) or other cognition theories.

If one wishes to document their own interpretation or reception of a work they might adopt a non-formalised approach to music analysis, such as a hermeneutic or phenomenological readings as discussed in sections 2.2.3.2 and 2.2.3.3 respectively. When doing so an analyst tries to suspend their assertions and adopt an open listening approach. This form of analysis could be expanded to multiple open listenings from more than one person to gauge if there are any similarities in interpretations.

3.2.1.3 Both

Combining both the production and the reception of the work requires an insight, or at least sufficient knowledge, of the production of a work and, through personal or audience testing, an idea of how a work is received. "The musicologist his or herself possesses knowledge or intuitions about the poietic process of the composer, or about perceptive processes in general; this knowledge enables the analysis to take on its poietic or esthetic coloration" (Nattiez 1990: 139). This

activity might be done to evaluate if the listener understands the intentions of the composers by measuring the composer's intentions against audience's interpretations. This sort of investigation might include providing the listener with the artistic intentions after providing feedback to an initial blind listening⁶⁶. If the focus is on the production and composition rather than the intention/meaning of a work then an analyst might consider investigating how the techniques utilised by the composer might impact on the listening experience.

Caution needs to be taken however, as focusing on both the production (and the intent) along with the reception does not necessarily provide the analyst with the one 'true' understanding of a work. An analysis, regardless of how much information it covers from both the production and the reception, ultimately has a biased perspective towards a certain objective of study. This, of course, is not a negative aspect of analysis, and should be the foundation for any investigation.

⁶⁶ The Intention/Reception project (Landy 2006; Weale 2005) is an example of such an investigation, albeit the intentions were to measure whether inexperienced listeners would find electroacoustic music more enjoyable if they knew the intended meaning behind a work. The same methodology could be adapted to measure if both experienced and inexperienced listeners understood the composer's intentions, if there are any to speak of that is.

3.3 The object of study

Since the material nature of music is difficult to define (as it is not a tangible entity), the object of the analysis must be clearly defined; it can be the score or the sound image, the mental image of the composer or its performance, etc. The definition of the limits and parameters of any analytical operation is therefore essential in order to make a useful work for the comprehension of music and in order to possibly avoid – or declare – the subjectivity of the analytical process (Zattra 2005: 24).

Moving on from the objectives of study one is immediately confronted with the question: what does one actually analyse? What might seem like a relatively simple question becomes extremely complex when one considers the potential scope of electroacoustic works that are not only fixed media. Such works might encompass live, interactive open-form structures and include other elements outside the musical creation, such as the acoustics of the performance space. So the question becomes: what, within electroacoustic music, is actually analysable? This thesis will assert that with the right methodology and strategy one can analyse anything. This includes both fixed media, open-form and even specific performances of a work. What is needed is some form of fixity⁶⁷ to provide the analyst with a fixed object of study and also to provide the reader with an understanding of what the analyst is using to base their investigation on. This can be achieved in a number of ways. For acousmatic music one might simply point the reader to a specific release of a published work, or provide them with a version they have used. For open-form works, such as installations, and indeed live

⁶⁷ Something, recording or a document, that exists outside of time.

performances (specifically those that have elements of improvisation), this becomes a little bit more difficult.

There are a number of ways to counteract the problem of ephemeral works, the first, and the simplest, is to record the event. For live performances this allows for some understanding of the event itself, but cannot communicate the entire experience. Likewise, for any interactive works, the notion of how, as an audience member, you experience it will be lost completely. In this instance it would perhaps be more suitable to provide an account of the experience by writing it down. The object of study in this instance becomes the written description of the event. It is important to note that these means of providing fixity cannot replace the actual experience of a work. In trying to provide fixity an analyst is ultimately sacrificing aspects of the intended experience. Therefore, it is imperative that they ensure that the aspects that they wish to investigate are transferred to the new, accessible, object of study. A written description is one method to ensure fixity when analysing an ephemeral or performance work. However, there are other possibilities that need to be taken into account. A few examples will now be given with potential ways of ensuring fixity other than a written account of the musical experience, which will be discussed in more detail in section 3.3.4.

This section will consider what is the object of study for electroacoustic music and how it might vary depending on which category of electroacoustic music one is

analysing. Firstly, it is important to distinguish what the musical pertinences of the object of study are from the extramusical ones. Note that the term *work* has not been used to denote the musical pertinences of a piece, as contextual elements relating to the experience might be considered a part of the work⁶⁸.

3.3.1 The sonic pertinences of the object of study

It might seem obvious, but when analysing a piece of music one always considers the sonic content. Whether the focus is on the production, reception or both, the central focus of the investigation remains on the musical pertinences of the work⁶⁹. This might seem a relatively simple concept; however, because of the various embodiments of the musical pertinences of an electroacoustic work, deciding what the musical object of study is can be difficult. We are left with a choice whether to have some sonic fixity to what we analyse (be it a recording of some form), or whether to allow for our memory of a performance/viewing to be a factor in the authenticity of an analysis⁷⁰. There are ultimately advantages and disadvantages to both approaches; however, these often reflect the perspective one adopts when considering what the objectives of study are. For example, if one wishes to investigate the production elements of a work then it might be useful to have

⁶⁸ This has greater relevance for those works that use external elements to the musical object of study as a primary part of the work. For example site-specific sonic installations where the space plays a major role in the experience of the work.

⁶⁹ These pertinences are identified at the beginning of any analytical investigation and are formed from the question one is asking.

⁷⁰ Of course when an analyst documents their experience of a work that is in fact fixing the work and creating an object of study.

access to a fixed recording of a performance, rather than relying on memory to be a factor (this would allow for repeated listening). If one wishes to investigate the listening experience of a work then they might be able to experience a performance and recount aspects of it later. Provided that this is decided prior to an analytical investigation one will be able to ensure that all of the necessary materials, or lack thereof, are collected before embarking on such an activity.

The form of an electroacoustic work also presents a problem when considering the musical object of study. For work of fixed duration there is a clear timeframe within which the music resides. However, for other works where there is the potential for an open-form work an analyst has to choose what he/she will include within their investigation. In this instance the analyst must make the reader aware of the limitation of such an investigation, as there is no way of rectifying this problem.

3.3.2 The context of the object of study

There are other factors one should take into account when analysing an electroacoustic work, as some categories of this genre present additional problems to the analytical approach. These factors rest outside of the musical object of study, but often have a large impact on the experience of a work, or indeed are considered a fundamental part of it. Hence, these contextual aspects can provide further insight into the intention and the subsequent reception of a work. The difficulty is how one expresses the impact of these potential aspects to the reader

of the analysis and how to use this contextual information in an effective way. Figure 8 provides a visual representation of how contextual information relates to the object of study whilst providing some examples (not all) of what could be considered contextual elements.

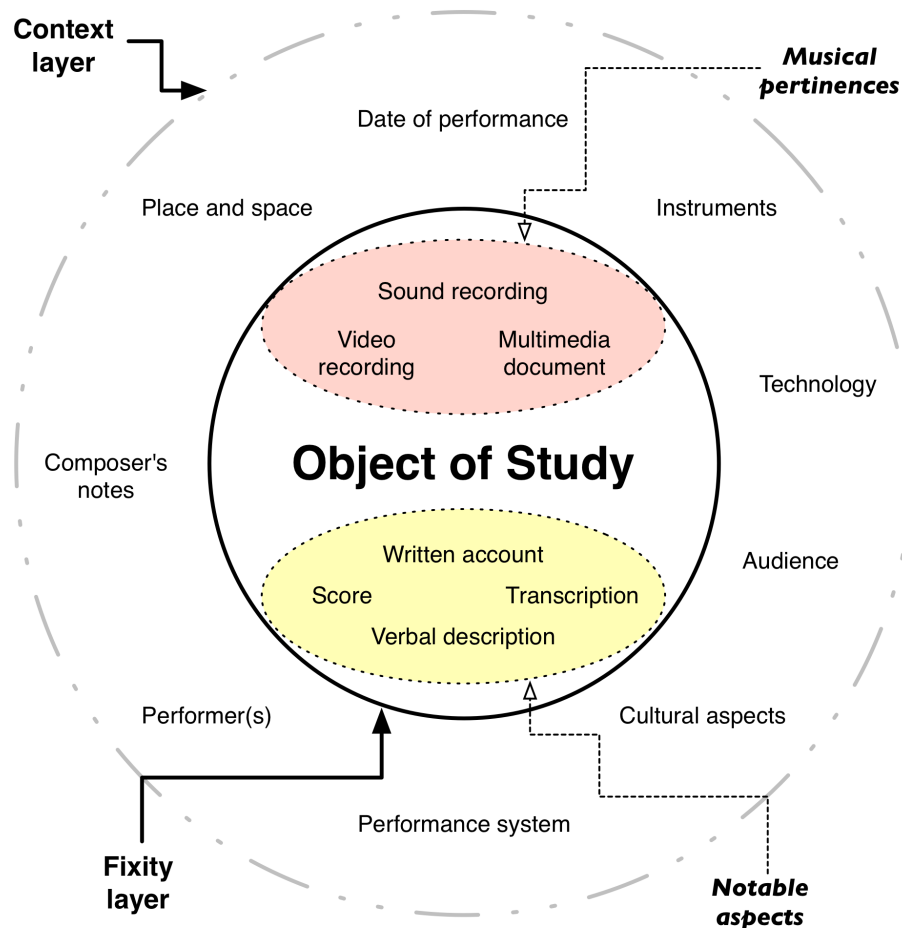


Figure 8. Contextual information diagram⁷¹.

⁷¹ It should be noted what the difference is between a *score* and a *transcription* within Figure 8. The *score* is a fixed written artefact of a work that is created by the composer, which performers, much like instrumentalists, follow in order to recite the work. A *transcript* is a written artefact that is created by the composer or a musicologist to highlight areas pertinent aspects within a work.

The inner circle within Figure 8 represents the fixed object of study, be it audio recording of the work (analogy, digital multimedia) or a written account of it. Within the former the analyst might search for musical pertinences, whilst in the later notable aspects might be discussed and investigated in more detail. The context layer that surrounds it are those elements that might not be represented within the fixed object of study, but are of fundamental importance to the analytical investigation and require to be communicated to the reader in one way or another. Contextual elements for an analysis that considers the production of a work might include composer's notes and/or access to the compositional material created during the compositional process⁷². Undertaking such an investigation would result in a genetic analysis, which would allow the analyst to evaluate the effectiveness of the composer's craftsmanship and if, from his or her personal perspective, the intentions are perceptible. It should be noted that contextual information regarding the piece is often provided to audiences before they enter a concert or an exhibition. Programme notes, interactive installation instructions and exhibition information panels are but some examples of such contextual elements. Landy (1994: 51) borrows the term "dramaturgy" from theatre to describe these extra pieces of information, which can divulge the artistic intentions behind a work.

For an analysis that focuses on the reception of a work, access to contextual

⁷² Access to such information could support hypotheses made through aural analysis of the compositional techniques.

information might provide an insight into the intended experience. Delalande (1998: 17) states that the object of study for esthetic analysis is “what one hears”; however, it might be more pertinent to state that it is actually what one experiences. There are categories of electroacoustic music that are intended to simulate more than just our hearing. Because of this more information is required to communicate the *mise en scène* for the analyst and potential readers of the analysis itself.

How these contextual aspects are communicated to the reader is once again dependent on the aims of the investigation and the work itself. For example, for performance works it might be beneficial to discuss the styles of the particular performer in relation to others. This might involve a critique of his or her style when performing other works as well. For installations this might involve the use of speaker arrangement plans, details of the building’s acoustics if necessary and potentially its history if this is relevant to the work. Ultimately, an analyst can be as detailed as they deem relevant in order to account for the potential gaps that the fixed object of study might not record. However, they should be wary to not overload the reader with information that might be superfluous to his or her investigation and aims.

3.3.3 Other factors of the object of study

To combat the problem of memory when analysing music a few strategies have

been adopted by a number of scholars. One strategy is to make a transcription of a musical work. Transcriptions of a work are an outcome of an analysis, albeit one which is only focused on identifying sonic elements within a work⁷³ (this is what Hugill (2012a: 234) refers to as *parametric* analysis). Although they allow for some fixity, which can aid in the analytical process, they ultimately only provide a splintered view of the musical work in question. Caution is advised when using transcriptions as the only means to analyse a work, unless they are used as a foundation to apply analytical tools that investigate a work's structural relationships, such as Roy's (2003) *grille fonctionnelle*.

3.3.4 Issues surrounding the object of study

There are some distinct differences in approaches one should adopt when analysing different categories of electroacoustic music. By its very nature this art form often amalgamates many different disciplines (such as fixed media, live electronics and interactivity), creating new hybrid categories in the process. To highlight the potential issues of the object of study three archetypal examples of electroacoustic works will be examined: acousmatic music, mixed and live electronic music and sound installations.

⁷³ Transcriptions have to, by their very nature, omit aspects of a musical work in order to highlight others.

3.3.4.1 Acousmatic music

Acousmatic music might seem rather simple, in terms of its object of study, considering it is an art form that is based on fixed media. However, if one considers its performance then a new level of complexity is added. Regardless whether it is the composer or an interpreter, the diffuser adds another musical element to the potential object of study.

At the time of the performance, there may be someone, possibly the composer, who manipulates the reproduction system and performs live diffusion. This person brings his or her own intentions for spatial meanings and nuance to the situation (Kendall 2010: 228).

If an analyst wants to consider a particular diffusion of an acousmatic work then they will need to find a means to communicate the listening experience to the reader. This might include contextual information regarding the interpreter's diffusion style and potentially the speaker system used within the performance. What is important in this instance is that the sense of the performance is portrayed to the reader, who might only have the fixed media version of the work at hand.

There are other possibilities in providing fixity to an acousmatic performance beyond just describing the contextual aspects or the experience through words. It is entirely possible, for example, to record the fader movements of a particular performance with a digital diffusion desk. These recorded fader movements could then be used to automate the diffusion desk whilst the piece is played back with the same speaker system, effectively recreating the same performance. This could

lead to further investigation into the juxtaposition of the varying interpretations of the same work by different performers in a controlled environment.

3.3.4.2 Mixed and live electronic music

Mixed and live electronic musics provide a different problem to the concept of the object of study. Firstly, by their very nature, there is always a performance, and therefore, an interpretation of a work each time it is played. The choice of whether to analyse a recording of a single performance, or potentially multiple performances is up to the discretion of the analyst. Secondly, the score, like in traditional instrumental music, is a fundamental part of the work and is not considered to be a contextual element⁷⁴. Finally, if new or self-devised electronic instruments are used information pertaining to their characteristics can help readers understand how they are played⁷⁵. These elements are not divisible from one another and all of these aspects of a performance (if applicable) need to be investigated within an analysis of such a work. For score based works the notation needs to be a fundamental part of any investigation, particularly if they pertain to the use of specific instruments.

⁷⁴ There might not be a conventional score for some works, specifically those that are indeterminate in nature, rather instructions that are then interpreted by the performer when realising the work. Of course there are those works that are entirely improvised without any parameters or instructions. For these types of works it would be pertinent to have access to a recorded realisation of the performance, whilst providing any contextual information necessary to communicate the experience to the reader.

⁷⁵ An analyst needs to have sufficient understanding of both the notation system and instruments used within a particular performance piece to be able to effectively analyse it.

Another interesting aspect of live electronics is differences in potential interpretations by performers.

Although music lives through the interpretation of performers, the consequences of reinterpretation need to be addressed. To what extent did the original composer wish or plan that a reinterpretation should be in fact a recreation? For pre-electronic compositions, it seems clear that limits on subsequent performers are implicitly narrow: a Beethoven sonata can be played on any type of piano; a Bach partita on modern or Baroque violin; a Stravinsky ballet suite by any orchestra with the requisite number of players and instruments. By contrast, compositions that use electronic or computer elements may implicitly invite interpreters to alter the composition more radically (Moore 2000: 106).

As Moore suggests the potential interpretations of scored works can be much greater than classic instrumental music, especially those that fall within the bracket of indeterminate works⁷⁶. Similarly to the interpretation of acousmatic works by different diffusers the realisation of performance pieces between different musicians should also face further scrutiny. Depending on the type of performances one could potentially record the other elements that are not captured by a single sound recording of the event, such as a video of a rendition of a particular work. This would not only document the playing style of the performers, but also the contextual aspects of the event such as the space and the *mise en scène*, which might add different parameters of interest that would be missed with a single sound recording of the event.

⁷⁶ John Cage to name but one example.

3.3.4.3 Sound installations

Unlike both acousmatic and live mixed or electronic works sonic installations do not necessarily have a particular beginning, middle or end. Often it is the choice of the audience who frame their experience of a work by choosing whether to continue hearing it, or if they want to leave. This represents a fundamental problem as there can be no real fixity of such an event; it really is an experience. A recording might help with analysing the sonic content of the work, but this is only a snapshot of a potentially multi-sensory experience. If one includes interactivity or site-specificity as well then further contextual information is needed in order to communicate these aspects of the work to the reader.

[...] an analysis of the composition of a site-specific installation must include its locale, because it derives its very form and perhaps physical substance, too, as well as its meaning, from the context. Moving it is impossible, since the work cannot be understood or seen except in relation to the place. The viewer witnesses a dialogue, as it were, between the artist and the space (Rosenthal 2003: 38).

The site, regardless whether the work is site-specific or not⁷⁷, needs to be explained to some degree as this ultimately has an impact on the overall experience of the work. "Site-specific brings the idea in which space embraces more than geometrical properties: materials as well as the history they can elucidate, architectural contexts, and even the cultural and social conventions that regulate the place of exhibition, all become constitutive elements of the art work" (Campesato 2009: 28). How an analyst might communicate the symbiosis between

⁷⁷ If it is not site-specific then how it occupies a space needs to be communicated to the reader.

the site and the work is not entirely clear⁷⁸, but efforts need to be made to ensure that the reader is aware of its significance.

There are other potential objects of study that could be created in order to provide better fixity for the analysis of sound installations. For example, with current technology it is entirely possible to create a virtual tour of an installation that could harness the use of binaural technology with a 3D realisation of the space. This virtual tour could then take into account the acoustics of the space if the work is also site-specific as well. This sort of object of study could lead the way for a similar investigate like Clarke's (2010) aural interactive analysis where the reader can control his or her own investigation into the work within defined parameters.

⁷⁸ Like the musical pertinences of the work the relevance of location needs to be communicated more so than other contextual elements of a work.

3.4 Reception of the analysis

The outcome of an analytical process, like an electroacoustic work, has to be interpreted by a reader. An analysis is a manifestation and synthesis of the information collected through the investigation part of the procedure for analysis outlined previously. It focuses the attention to certain pertinent traits of the object of study, be it musical pertinences (or notable aspects if using a score or descriptive text) and/or contextual elements. Separately these aspects might not communicate the perspective of the analyst; therefore, it is imperative that he/she chooses the best method of communicating this information to the reader. This is the final stage of the analytical process – *to form coherence*.

It is important that an analyst considers how they might tackle this potential problem and consider how the analysis is received. “An analysis in effect states itself in the form of a discourse – spoken or written – and it is consequently the product of an action; it leaves a trace and gives rise to readings, interpretations and criticisms” (Nattiez 1990: 133). Three main archetypes of analysis (written, visual and multimedia) will be considered and discussed in detail to highlight the advantages and disadvantages when choosing to communicate a perspective of a work.

3.4.1 Written/verbal analysis

As discussed in section 2.1.1 written analyses⁷⁹ are split into three types: impressionistic, paraphrases and hermeneutic readings. Depending on what the analyst is trying to achieve, or what question they are posing, they may adopt a different writing style. An analyst might do an impressionistic analysis if they want to discuss intricate compositional techniques adopted by the composer, which often requires using subject specific terminology. Some analysts might want to explain, in relatively simple terms, what is happening within the work. In this instance the analyst would paraphrase pertinent events and structures. Finally, if the aim were to communicate an interpretation of the work then the analyst would undertake a hermeneutic reading (which might also include a semiotic or phenomenological interpretation as well).

One should not be under the impression that language is infallible. As Conard (1911: 11) states “words, as is well known, are the great foes of reality”. We also should not put too much faith in a written analysis’s ability to communicate exactly what the author is trying to say. This is specifically evident when one is trying to communicate an interpretation, as the reader, who might arrive at a different understanding, will interpret much of the language that the analyst uses. “[...] emotional states are much more subtle and varied than are the few crude and

⁷⁹ Nattiez (1990: 161) refers to them as “non-formalised” analyses.

standardised words which we use to denote them” (Meyer 1956: 8). When one is relaying factual information this problem becomes less prevalent, but will still exist.

3.4.2 Visual analysis

Visual analysis can constitute a number of outcomes. Much computer-aided analysis provides visual representations of sounds and, for the more advanced algorithms, structural information. These are not under discussion here as they do not require a human agent in the actual visualisation of the work beyond just defining the parameters of the computer-aided investigation. Instead the focus will be on visual analyses that are the outcome of an aural analysis. Couprie (2004: 109) identifies two types of visual representations that can be created through aural analysis: iconic representation (representation based on shapes that visually depict the movement and morphological elements of a sound) and symbolic representation (accurate notational representation that often requires a legend for users to understand). See Figure 9 for examples of the two:



Figure 9. Iconic and symbolic representation (Couprie 2004: 110).

The difference between these two methods of representation can be best

described as typological/morphological and notational. Both offer different advantages and disadvantages by omitting certain pertinent information that the other utilises.

The didactical qualities of such a representation are obvious: listening repeatedly whilst following the graphics enables the sounds, structures and even some of their more difficult qualities (which often escape the neophyte) to be identified. But representation is also an analytical tool that allows a researcher to refine his listening of the work by attempting to distinguish which graphic can be associated to which sound and why (Couprie 2004: 111).

Symbolic representation might be able to convey more through the notation systems, but is not as readily understandable as some iconic representations. It also often requires expert knowledge of the particular notation system being used. Iconic representation, although much more intuitive than symbolic, suffers from potential misinterpretations and vagueness. Like written and verbal analysis one must be aware of their intended audience when deciding which of the two to use.

These forms of analysis, although very useful for identifying pertinent musical aspects of a work, are unable to describe the contextual aspects of a work. For this reason visual analysis functions better with works that have a finite time span. If an analyst does use visual elements to analyse a work that has strong contextual information then they would need to include a written accompaniment to describe this.

Evocative transcriptions are another alternative to visual analysis that do not

necessarily conform to a proposed schema. By their very nature they encourage abstract expression of the listening experience and in doing so they might not necessarily follow standard conventions of visualisation in music, such as a time indication from left to right. “Although such visualisations are not notations of music in the traditional sense, and certainly are no substitute for actual listening, their value lies in the extent to which they represent an act of conscious listening and reflection” (Hugill 2012a: 237).

3.4.3 Multimedia analysis

Multimedia analysis allows for something that both written and visual analyses cannot offer; they provide the user with the ability to manipulate the focus of the analysis depending on what they want to investigate. There are still boundaries to the analysis, but there is the potential for multiple perspectives to be organised within one multimedia representation. Software, such as the Acousmographe or EAnalysis allow for the users to listen to the work (in real-time) whilst viewing a visual analysis of it. There is also the potential for descriptions of other elements not necessarily possible with visual analysis, such a three-dimensional representations of spatial movement within an acousmatic performance or sonic installation. Other examples of multimedia analysis, such as the Groupe de Recherches Musicales’ 2000 CD-rom entitled *La musique électroacoustique* and Clarke’s interactive aural analyses provide users with the ability to investigate compositional processes utilised by a composer.

3.5 Chapter summary

The aim of this chapter was to dispel any assertion that analysis, specifically perceptual analysis, can be objective. There is no such thing as an authentic objective analysis in music, only an authentic subjective analysis. We are bound by our idiosyncrasies in both our attempts in analysing and in understanding the analyses of others. A better understanding of what we want to comprehend and how to communicate the different perspectives one might have on a particular work is what is needed to create an authentic subjective analysis. No matter how objective an investigation might seem the choices in focus and the chosen elements of the analysis ultimately make any analysis subjective and specific to a conscious, or indeed subconscious, perspective.

Ultimately, the very existence of an observer – the scientist, the analyst – preempts the possibility of total objectivity. No single method or approach reveals the truth about music above all others, yet each age has felt that it is moving towards the authentic method (Bent 1980: 343).

Boesch (1996: 229) provides four points concerning analysis, which contextualise the entire argument of what electroacoustic music analysis is and what it is not:

- analysis does not provide objective information about a work;
- music is not reducible (there is no musical way of saying “you see what I mean!”);
- analysis is a form of interpretation;
- when one loses information (or adds information) during analysis, no synthesis lets us recover the initial object, but rather lets us synthesise new objects, with increasing differentiation between them, thanks to analysis that will probably have allowed the creation of “classes of objects”.

Even if one argues that they have no goal for analysing a piece they still have to make a choice in what elements they focus upon. Analysis works better when there is a clear question one is trying to answer, which for an art form like electroacoustic music becomes even more important as there is no precedent for analysis. The only way we can communicate an understanding is through interpretation of the music. We analyse a piece of music when we attempt to communicate our interpretation of it. In doing so we break the work down into comprehensible segments in order to communicate that perspective. One will never understand the ‘truth’ or the sublime nature of a composition through analysis, but it will give some insight into how a person views the work.

Analysis is a creative endeavour, one where the subject’s idiosyncrasies and cultural upbringing have an impact on their chosen reasons and methods of analysis and ultimately their perspective on the work. In that sense an analysis is always imperfect⁸⁰ and the procedure for analysis (*to question – to investigate – to form coherence*) presented in section 3.1.3 is a potential universal methodology that provides a fixed framework for analysts to work within, whilst providing flexibility for him/her to communicate their individual (imperfect) perspective. This framework will later be expanded upon in chapter 4 and applied in chapter 5.

⁸⁰ The concept of the imperfect analysis will be used later within this thesis in chapter 6.

This question: *how does this piece work?* (the fundamental question one asks when analysing a work); although simple in its presentation, is a 'can of worms'. Considering this the range of potential questions one could pose could open up an investigation into cognition, meaning, interpretation and perceptual theories. Therefore, it is extremely important for an analyst to decide upon objectives of study in order to narrow their investigation towards certain aspects of a work. The choice of which perspective an analyst might adopt is fundamentally linked to what area (production, reception or both) they choose to investigate.

There are of course other categories of electroacoustic music that have not been considered within this chapter, such as audio-visual works. However, the main concepts raised in this chapter remain the same; one needs sufficient information in order to analyse an electroacoustic work, be it musical pertinences or contextual elements. It is ultimately up to the discretion of the analyst how much information is needed to analyse a work and for their perspective to be effectively communicated to a reader. Contextual information is needed to fill in the gaps of the listening (and indeed the overall) experience of a work when the chosen musical object of study does not communicate this.

It is important to remember that a reader of an analysis might not share the same perspective of a work that the author does. This is because the author has, more often than not, invested a lot of time into investigating a specific perspective, which

might not be what the listener hears when they experience the piece themselves. “The perception of the analyst differs from reception of the auditor because of the reduction they exert on a given sound: after listening to a given sound many times the analyst is able to perceive details which will pass unperceived at the time of a contextualised listening and in real time practised by a listener” (Roy 2003: 30 translated by Gatt 2013). It should also be stated that certain categories of electroacoustic music lend themselves more to certain types of analytical outcomes. For example, open form works (obviously depending on the object of study as well) would more suitably be analysed with a written/verbal analysis, rather than a visual representation of a snapshot⁸¹ of the musical outcome. However, if one were capable of rendering a multimedia environment that would simulate the installation, then a multimedia analysis might also be suitable. The fact of the matter is that visual representations depend upon some fixed version of the work for both the analyst and the reader. Written/verbal or interactive can either describe the experience or provide sound examples to give a fuller picture⁸². The choice of what type of analysis one should undertake is therefore dependant on the object of study itself.

The reason this thesis is moving away from forming a new all encompassing tool for electroacoustic music analysis is because one cannot foresee how

⁸¹ The *musical snapshot* being a recorded section of the open-form work in question.

⁸² Provided that interactive analysis do not infringe on any copyright.

electroacoustic music will evolve with the new technologies and the new categories that might be formed. One could feasibly take all of the research from the first chapter and construct such a tool, but at the expense of depth or scope (concessions would need to be made at some point within its development). In defining a tool one is effectively dictating one method of forming coherence and ultimately advocating a single perspective of a work. Instead, the procedure for analysis outlined in this chapter, because of its ambiguity, allows for a number of different rationales, methodologies and outcomes and thus allows for the potential changes in technology and the advent of new musical forms. Hence, chapter is providing the framework for a culture of analysis that concerns different perspectives from different analysts, rather than one searching for the single truth behind a work. None of the analyses within this proposed culture are perfect and only investigate certain aspects of the work, outlined within the *to question* stage of the investigation. Conversely, analysts might share the same objectives, but decide on different way *to investigate* the work in order *to form coherence* for the reader. Ultimately providing a different perspective on the same object of study whilst proposing the same question(s).

4.0 The electroacoustic toolbox

4.1 What is the electroacoustic toolbox?

In the previous chapter the concept of what electroacoustic analysis is was defined within the scope of this thesis. The process of analysis was defined as a combination of *to question* – *to investigate* – *to form coherence* as a systematic way of undertaking such an endeavour. This chapter will present the electroacoustic toolbox – a collection of criteria with which one can compare and contrast analytical tools and methodologies for electroacoustic music analysis. The intention is that the toolbox will provide a framework that will aid an analyst in deciding which tools are applicable for their specific needs. It is not intended to influence their analytical choices a priori; rather it provides recommendations on which tools would be most applicable to the analytical question the analyst is proposing⁸³. It acts as an ontological segmentation of a fixed object of study. The criteria that are used within the toolbox are derived from aesthetic and cognition studies to illuminate how one ‘makes sense’ of a musical work. The toolbox is therefore listener centric, placing experience above the intentions and compositional techniques of the composer(s); although it is up to the discretion of the analyst how much poietic or production information should be used depending

⁸³ This means that the electroacoustic toolbox will be used generally within the *to investigate* part of the process of analysis. Although there might be occasions where the intention for analysis is to test a particular analytical methodology. In this instance the toolbox might be used within the *to question* part of the process of analysis to verify what criteria it satisfies. An example of this will be investigated in section 5.1.

on their analytical agenda.

It is important to clarify that the toolbox criteria have been developed to focus entirely upon investigating a fixed object of study (as outlined within Figure 8 in section 3.3.2⁸⁴). This fixity is required in order to first ensure the creditability of the analysis and that the outcomes are communicable to the reader, who would be able to understand the origins of the investigation and how the analyst has come to his or her conclusions. Therefore, the criteria and terminology used within the toolbox only concerns those elements that fall directly within the musical experience of a work (both perception and potential aesthetic experience), which are hopefully recorded within a suitable fixed object of study. Other contextual elements related to the work discussed within section 3.3.2 need to be addressed, if necessary, by the analyst, but the toolbox itself does not offer a means to do this.

The toolbox is designed to be multifaceted in its application and use. Firstly, it is intended to generate meta-level criteria with which one can cross-examine the analytical tools and methodologies for electroacoustic music, defining the gaps and shortcomings of the current field. Secondly, the criteria used to cross-examine the analytical tools can also be used to develop a deeper understanding of how

⁸⁴ This might be either a fixed media artefact (such as a audio file or another multimedia data object) based on it musical pertinences, or a document of some description (score, written account, transcription etc.) within which notable aspects might be explored.

electroacoustic music is understood by listeners. It segments the object of study into individual digestible units for further investigation.

The first idea which might occur to someone who wants to analyse a piece of electroacoustic music is to listen to it a number of times and try to distinguish the units (neither too large nor too small) which make up the music. Quite soon one will need to take pen and paper to sketch some kind of transcription from which one will subsequently try to pick out shapes, symmetries, and some sort of organisation. Building on this base it may be possible to make observations about form, realisation processes or the significations evoked (Delalande 1998: 17).

The meta-level criteria are employed as identifiers⁸⁵ to compartmentalise a work of electroacoustic music. These identifiers are a means to distinguish pertinences or notable features of an object of study in a fixed manner⁸⁶ as a basis for further discussion and investigation, whilst allowing for different perceptions of the work. As the terms used within the toolbox are relatively intuitive (more so than other specialist terminology provided by the tools within the toolbox, such as spectromorphology⁸⁷) it provides non-specialists the same capacity to effectively communicate a perspective of an object of study as well. However, since these are merely identifiers they cannot themselves fully describe the elements they single

⁸⁵ Not a descriptive language, but merely a means to segment an object of study. It is a language that establishes these units for further discussion.

⁸⁶ A description of a temporal experience has to be fixed in order to give a particular perspective of it, which could be multidimensional. This could be based on multiple experiences of a work that inform an overall fixed description.

⁸⁷ That is not to say that spectromorphology is not comprehensible, but that it is not immediately intuitive and requires the analyst to have a good understanding of the terms within and the surrounding literature. Smalley (2010: 94) has also stated that spectromorphology is intended for specialists first and foremost, rather than those with little knowledge of electroacoustic music.

out⁸⁸. If a listener wants to investigate these identified elements in more detail (how they work?, why they work? etc.) they would need to apply an analytical strategy through the application of a tool.

Finally, the scope of the electroacoustic toolbox is intended to encompass all categories of electroacoustic music and not just those that are originally based on fixed media. To accommodate this, the meta-level criteria have been chosen to account for most musical experiences to provide flexibility to the analyst depending on his or her perspective of the work and the type of work they are investigating.

4.1.1 The basic framework – breaking up the object of study perceptually

Returning to section 2.2.2 of the introduction (*the perception and segmentation of music*) a number of reoccurring themes regarding the segmentation of music into units of single or grouped sounds arose. Schaeffer discussed these three levels of a work within the *Traité des objets musicaux* albeit using different terminology that related to his *solfège*:

In the traditional system we could clearly perceive these three levels of musical language. The “acoulogical” stage, so well integrated that it seemed almost immutable, with no possible variants, was a certain number of sounds given by a well-determined range of instruments, which defined a “musical” totally purged of the “sonorous”. Then there were the structures given by musical theory and [...] the whole melodico-harmonic code [...] which of course gives rise to the entire traditional system of reference. Finally, there were the works, their meaning guaranteed by their internal economy (Schaeffer 1966: 626 translated by Gatt 2013).

⁸⁸ The identifiers are used to provide fixity. In identifying a part within a work one is taking it out of its context, allowing one to investigate it in more detail, or to simply discuss it.

The agreement, as defined within the introduction, was that generally there are three levels within a musical work: the single lowest perceptual unit within music⁸⁹, groupings of these elements into musical structures⁹⁰ and, finally, the overall form of the work. For the purposes of this thesis these three areas will be defined as: *sound events*, *meaningful units* and *form* respectively. This is not only related to how we listen to music, but also how we come to communicate aspects of it as well. There is, of course, a hierarchy within this segmentation of a musical work. That is to say that the larger structures are made up of other smaller structures or individual sound events. Figure 10 demonstrates this hierarchy.

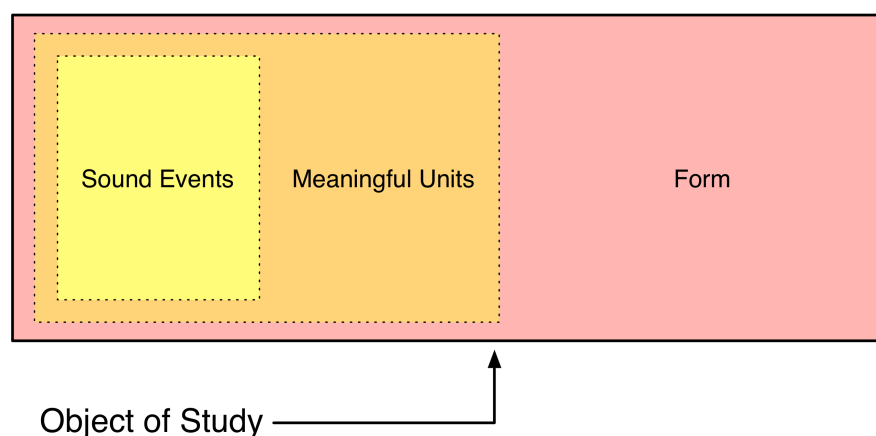


Figure 10. Segmentation of the Object of Study.

⁸⁹ This is related to both our short-term memory (echoic memory as Snyder (2000: 3) refers to it) and our perception of what will be termed a sound event within Kendall's (2010: 66) schema (figure 3 in section 2.2.2.1), which relates specifically to a sound's morphology.

⁹⁰ These structures are established by the composer/performer within the actualisation of a work (be it in the studio or in its performance) and then interpreted by a listener, who may or may not agree aesthetically with the compositional choices taken by the composer.

It is important to stress that this hierarchy is not to imply particular importance to the higher levels of an object of study, but rather to show the dependency higher levels have on the workings of their respective lower components. That is to say any of the criteria used to define a lower level, such as sound events, are also relevant to higher levels. For example, one of the fundamental constituent elements for a sound event is duration. This, of course, has relevance to higher levels as well. Conversely, criteria from one of the higher levels cannot be used within a lower segment. One example of this is the idea of the movement⁹¹ (which will be highlighted later in section 4.1.1.2.2). Movements are placed within meaningful units and are made up of relationships between smaller structures; hence, this criterion cannot be used to describe a sound event.

Although readily understandable to most people this is not the entire picture of how we ‘make sense’ of a musical work. Within these three levels lie other layers of understanding, specifically within the sound event and meaningful unit segments. These will be expanded upon now, including the criteria with which the different levels are defined.

4.1.1.1 Sound event level

The term *sound event* has been used here instead of sound object (*l’objet sonore*)

⁹¹ The word *movement* is a self-contained structure of many smaller structures within a work.

to describe the smallest perceptual element within a work. This is to avoid any confusion with the concept of reduced listening and the necessity of it when defining sound objects, as discussed within section 2.2.1 “By compartmentalising real-world sounds into objects and suggesting that listeners might focus their attention solely on the timbral activity within a sound, Schaeffer had effectively invented the electroacoustic equivalent of the note” (Field 2000: 37)⁹². Sound events, in the context of this thesis, maintain the idea that a sound can have significance for a listener’s specific understanding of it, which consequently affects their perception of the object of study in question. However, inside the perceptual framework within the toolbox the sound event level will only focus upon the perceived qualities of a single sound. Therefore, it could be considered to be following Schaeffer’s concept of the sound object. The significance that might be associated with a sound event will then be addressed within the aesthetic experience framework (section 4.1.3), within which further criteria will be used to investigate a sound’s referential and potential evocative nature (covered by the expression section). Hence, the overall term *sound event* will be used as a moniker in place of *sound object* with the proviso that the study of a sound will be split both into both its perceptual and aesthetic qualities. This divide highlights one of the main differences between the ‘note’, the smallest conceivable unit in Western instrumental music, and the sound event within an electroacoustic work. Both

⁹² Even though it may be said there are limited correspondents between the two (objects and notes).

share the same constituent elements that define them (which will be discussed in more detail below), but are perceived entirely differently. The divide between real-world and abstract sounds is particularly relevant here. Of course electroacoustic works, and indeed some notational works, can encompass both abstract and real-world sounds. However, for the purposes of this argument the focus of electroacoustic music has moved away from melody and harmony towards what might be called a sound gesture and texture paradigm⁹³.

How one defines what constitutes an individual sound event is entirely based on one's perception of the sound in question. Where one person might perceive many small minute sound events another listener might consider these to be one cohesive unit. Schaeffer (1966: 459), Smalley (1997: 117) and Kendall (2010: 66) have all considered this within their respective diagrams depicting what constitutes a sound event. They include the concept of an iterative sound and a continuous sound. It is for this reason that the sound event level has been split into two subsections: sonic entities and gestalt units. It is important to mention that a listener might hear a single gestalt unit within one listening and then multiple sonic entities within a second. Emmerson (2008) highlights the potential differences in interpretations of a prolonged sound event when he states the two definitions for the term *event*:

⁹³ That is not to say that this paradigm cannot or does not exist within traditional music. Just that, generally, it is defined with other factors such as melody, harmony and rhythm.

1. “an identifiable change in a given quality, taking place at a specifiable time (with duration not considered);
2. a sonic unit, assumed to be relatively short in duration, which has a clear identity. The time of occurrence is usually clear and noticeable.”

The subtle differences of changes in a given quality might mean that one listener might consider a sound to be a single prolonged gestalt unit, or, because of the changes, separate sonic entities. The listening focus⁹⁴ is of fundamental importance here and the analyst must decide within the *to form coherence* part of the analytical investigation which of the two is more relevant to their listening experience and overall perspective of the work they are analysing⁹⁵.

4.1.1.1.1 Sonic entities

A sonic entity is a short definite sound event that perceptually has a clear beginning, middle and end⁹⁶. It is formed from the most fundamental of constituent elements. The level criteria for a sonic entity consist of: duration, envelope,

⁹⁴ Kendall (2006; 2008) has subtly mentioned the importance of focus in regards to how listeners change their perception of sound events within a work.

⁹⁵ An analyst might perceptually hear the work many different ways between different listenings. The differentiation between a sonic entity and gestalt unit below is intended to account for these occurrences.

⁹⁶ Sonic entities are prevalent in a lot of electroacoustic works, specifically acousmatic ones. Many fixed media compositions begin with the actual sound source before any manipulation takes place. The first section of Jonty Harrison’s *Klang* (1982) highlights this point and helps define a clear sonic entity.

intensity, spectrum, timbre and spatiality⁹⁷. None of these elements are individually separable from the sonic entity because of the “perceptual binding” within the early stages of processing as outlined by Snyder (2000: 20); however one might remark on their qualities within a sound.

These level criteria are shared by all music; however, the inclusion of spatiality has been used for those electroacoustic works that utilise spatial placement and movement as a compositional component. The criteria are relatively self-explanatory, as they form the basis for many understandings for how one discusses a sound event, but for further clarification each will be outlined within the context of this thesis. Every sonic entity is, basically, formed through these constituent elements⁹⁸:

- Duration – the time span of a sound event from beginning to end.
- Envelope – the dynamic shape of a sound event over time.
- Intensity – the perceptual force and energy of the sound within the context of the work.
- Spectrum – the frequency distribution of the sound in relation to the note-noise continuum as discussed in Smalley (1997: 120) and by Schaeffer

⁹⁷ There are, of course, many other terms and definitions that could be used to describe the qualities of sound events. However, for simplicity and accessibility six terms have been used as umbrella descriptors for the way we perceive individual sound events.

⁹⁸ These elements are based entirely on perceptual qualities and could, therefore, be considered to be applying Schaeffer’s concept of reduced listening. This is a conscious omission of the referential and expressional aspects of a sound. These concepts will be explored in more detail within the aesthetic experience section of the toolbox (section 4.1.3).

concept of *mass* (1966).

- Timbre – the sonic identity of the sound event when compared to others within a work⁹⁹.
- Spatiality – the placement of a sound event within the virtual or physical space of the work.

It is clear that all of the criteria mentioned above depend on each other and cannot be separated perceptually. These criteria have been chosen because they are the fundamental elements with which one could describe a sound and therefore ideal for cross-examining analytical tools that focus on individual sound events. Although you cannot perceptually ignore other constituent elements within an individual sonic entity you can focus on a specific component of the sound, for example one might focus on a particular sound's timbre¹⁰⁰.

Although some of these criteria could be considered objectively (such as intensity and spectrum) the emphasis is always on perception. This perception can change between listenings depending on that particular focus of the listener on that particular experience of the work. It is also related to the sound's position within a piece and how it functions within a work. For example, the perceptual intensity of a sound event is dependent on its relation to other sound events and indeed its

⁹⁹ The simplest definition of timbre has been used here since spectrum is used as well to describe frequency distribution.

¹⁰⁰ One might do this to compare a sound event to other similar sounds within a work perhaps to understand why perceptually one hears them as distinct unique events

placement within the structure of a work. A sound event on its own might sound rather impactful; however, when placed in close relation to other sounds of perceptually higher intensity it might be considered incidental.

There might be some confusion regarding some of the criteria listed above, particularly when the meanings are closely aligned. Envelope and intensity could be confused with one another, as a sound envelope is formed by varying intensities as a sound moves through time. The fundamental difference is that intensity, in this case, refers to the sense of a sound event's power in relation to other sound events and indeed within the overarching structure of the work. *Envelope*, is closely related to *duration*, as the perceptual envelope of the sound is what actually defines the duration (beginning, middle and end) of the sound. The distinction between spectrum and timbre is frequency perception (note to noise continuum) and textural (sonic) identity respectively. Schaeffer defines spectrum (mass) as "the quality whereby sound is registered (somewhat a priori) in the pitch-field" and timbre (termed *harmonic timbre* within Schaeffer's terminology) as "more or less diffuse halo, and, in general, the additional qualities which seem to be associated with mass and enable it to be described" (Schaeffer 1966: 516 translated by Dack 2009). Therefore, spectrum could be the objective correlation of timbre¹⁰¹. Obviously, the sense of timbre is formed from the spectral characteristics of a

¹⁰¹ This correlation is being made within this thesis, but it should be stated that Schaeffer disliked the term *timbre*, generally favouring other terminology as outlined above.

sound event; however, two sound events might have the same fundamental pitch whilst having differing timbral characteristics.

4.1.1.1.2 Gestalt units

Gestalt units have been added to the sound event level to account for those sounds that perceptually seem to be indistinguishable from one another because of their relation to one or more of the gestalt principles of: proximity, symmetry, similarity, closure and continuity¹⁰². They are fused masses of unified sonic entities, which are not perceptually heard individually¹⁰³. Gestalt units can account for a number of different sound events that occur within electroacoustic music. For example, a drone, although considered one sound event by many people, might change in timbre and/or pitch over (a particularly long) time when compared to sonic entities. Another example of a gestalt unit is a granulated sound that is perceptually heard as one sound event, but is in fact made up of tiny short sonic entities. Finally, an electroacoustic gesture, although compositionally made up of many different sound components, is perceived as a cohesive single sound event because of the gestalt principles, which are as follows:

¹⁰² These five gestalt principles have been taken and adapted from the *Prägnanz* school of thought and have been distilled from the various gestalt theories applied to music (particularly electroacoustic music) from the work of Bregman (1993) Snyder (2000) and Roy (2003).

¹⁰³ To clarify, the term gestalt units only refers to sounds that are perceptually grouped together to create one single sound event and does not refer to relations between two or more perceptually identifiable sonic entities. There is of course a cross over with grouping units, where gestalt principles play a part in the grouping of discrete sound events. However, for this framework the term gestalt unit only refers to those sound events and not musical structures.

- Proximity – the psychoacoustic phenomenon where sonic entities are placed in close temporal proximity so that they begin to sound as a single sound event. “If temporal separation is viewed as a sort of proximity, then sounds that are near to one another in time will group with one another” (Bregman 1993: 196).
- Symmetry – the fusing of sonic entities that occur at the same time in the vertical field, usually because of their pitch relationship. This might refer to a chord, for example, where the harmonic relations make one hear three single stacked sounds as one fused event.
- Similarity – the amalgamation of sonic entities dependent on their timbre in both the horizontal (time) and vertical (frequency spectrum) experience.
- Continuity – a prolonged sound, such as a drone, that lasts a long time making it hard for a listener to remember its progression, yet is still perceived as a single sound event. Continuity also relates to sounds that might be interrupted by other events, but, because of their “smooth trajectory” (Bregman 1993: 198), they are perceived as one sound event.
- Closure – the grouping of sonic entities that share the same or similar sound envelopes.

A gestalt unit could potentially last the entire piece¹⁰⁴; however, it is again up to the judgement of the listener to decide if and when the gestalt unit ends, or even occurs. This might be for a number of reasons that perceptually interrupt the criteria, which made the sound event a gestalt unit, such as a major perceptual change to the timbre, pitch, or an abrupt stop or interruption by another sound event. Furthermore, it might not be perceptually possible to segment prolonged sounds, particularly textural sounds, into lower-level units¹⁰⁵ (since they are perceptually one single unit), although one can discuss its typology (Smalley 1997: 117).

The criteria listed, although interdependent, might be incorporated together to form a single gestalt unit. For example, closure and proximity are related as the individual sonic entities need to be relatively close together (as they are both concerned with time-based relations) in order for the listener to hear their similarities in relation to their envelopes. With this in mind the criteria become the constituent elements for defining a gestalt sound. The more criteria a gestalt unit incorporates the less ambiguity there might be between it being perceived as a

¹⁰⁴ La Monte Young's *for Brass* (1957), although not an electroacoustic piece, is a potential example of such a work. It would depend on the analyst's interpretation of the work whether they believed it to be a single gestalt unit, or a number of gestalt units joined together through subtle changes in pitch and intensity. If it is viewed as a single gestalt unit then the gestalt unit will also become the overall form of the work as well.

¹⁰⁵ This is particularly true within the listening flux; however, with repeated listening one might (and there is a strong emphasis on *might* within both this footnote and the sentence) be able to start to hear individual sonic entities that create closely-knit event relationships.

single perceptual entity, or a collection of sonic entities forming an event relationship.

It is important to note the way the gestalt principle is being used within the context of this thesis. Others might use the term to refer to the entire object of study as it is the combination of internal structures that form gestalt elements. However, within this thesis the term gestalt has been applied to account for the changes in perception one might have when hearing a collection of sounds for the first time and also the changes in perception depending on the listening orientation of the auditor. The term *gestalt units* has been applied within this thesis to account for those circumstances.

4.1.1.2 Meaningful unit level

The meaningful units section aims to describe how sound events operate and work (musically) together within the temporal experience of a work. Smalley (1997: 114) continues this by stating that “structural functions are concerned with expectation” and that “during listening we attempt to predict the directionality implied in spectral change”, obviously hinting that memory and musical understanding play a major part in compositional preferences and an audience’s interpretation¹⁰⁶. It is therefore arguably the most important aspect of any work and any analytical investigation, as

¹⁰⁶ Expectations might be because of understood musical rhetoric on that part of the listener, or heard schemas set up by the composer within a composition.

these relations between sound events, to some degree, define how we categorise individual works into different genres and categories. The potential ramifications are that it might provide a means to construct a compositional rhetoric for specific categories of electroacoustic music. However, this is something beyond the scope of this thesis and the meta-level criteria provided within this section of the toolbox¹⁰⁷.

Like sound events one cannot simply state that there is only one type of meaningful unit. Within the context of this thesis two main archetypes of meaningful units have been defined: event relationships and high-level structural relationships. These relate to relationships between individual sound events to form immediate musical structures and how those small musical structures relate together to form larger musical structures respectively.

4.1.1.2.1 Event relationships

An event relationship is when two (or more) perceptually distinct sound events form a musical conjunction or connection with one another. This might have implications on how a listener perceives these individual sound events within the context of the work, as opposed to listening to them separately with no relation to any other sonic

¹⁰⁷ The toolbox provides meta-level criteria for potentially every manifestation of electroacoustic music. Because of this it cannot go into specific characteristics of individual categories of electroacoustic music.

material. The criteria for this section are as follows: layering, sequence, repetition and rhetoric¹⁰⁸. All of which will be discussed in more detail now:

- Layering – the relation of two or more separate sound events sounding simultaneously with one another to create a musical relationship in the vertical plane of the musical experience.
- Sequence – the relation of two or more separate sound events running in succession that are perceptually grouped together to form a meaningful passage in the horizontal plane (time).
- Repetition – the recurrence of a perceptually discrete sound event over and over again. One that is perceptually distinguishable and not considered a group because of similarity, perhaps because of their proximity to one another.
- Rhetoric – specific relations formed by the style of music one is listening to. Rhetoric is vast in its expanse in relation to the other criteria within this section. A call and response relationship between two sound events is but one example of a potential rhetorical relationship. It should be noted that rhetoric is learnt and not innate¹⁰⁹, unlike some of the gestalt principles listed above.

It might appear on first glance that the criteria for this section share similar

¹⁰⁸ Many of the criteria, specifically rhetoric, are taken from Roy's *grille fonctionnelle* (2003: 340) and adapted for the purposes of the toolbox.

¹⁰⁹ As suggested by Snyder (2000: 196).

rationale for declaring whether the relationship between sonic entities form a gestalt unit or an event relationship. The difference between gestalt units and event relationships depends on one's perception of the event, or indeed events. The intention of the closeness of this relationship is to provide flexibility for different analysts to propose different perspectives of the same work. There is a clear crossover between certain criteria within event relationships and gestalt units. The important distinction is whether the listener perceives two (or more) individual sound events structurally working together (which would indicate an event relationship), or whether they are so closely related that they are perceived as a single sound event (which would mean it would be classed as a gestalt unit). The perception of this is liable to change between listenings and is sometimes dependant on the focus of the listener at that particular time. Once again it is up to the discretion of the analyst to decide which of the two is more relevant to their particular perspective and analytical intention.

4.1.1.2.2 Structural relationships

Structural relationships refer to larger scale forms within a work, which are made up of smaller event relationships. These relationships can be either through time (horizontally), or occurring at the same time (vertically)¹¹⁰. Finally there are those relationships that encompass both smaller event relationships and even larger

¹¹⁰ Individual event relationships might start and end at different times to each other, but for the moment when they are in parallel they have a vertical relationship with one another.

structural relationships (both horizontally and vertically) to create movements within a work:

- Horizontal architecture – the relationship between smaller structures through time.
- Vertical architecture – the relationship between smaller structures occurring at (roughly) the same time.
- Movements – the relationship of larger structures to form a self-contained section(s) within a work that can relate to a narrative or a thematic scenario depending on the type of electroacoustic music one is analysing. Deals with both horizontal and vertical relations of large structures.

Since some smaller structures occur at different points within a piece the relationships sometimes are not apparent upon a first listening. It is only when a listener has a greater understanding of the work as a whole that they can comprehend larger scale relationships and how these structures have an impact on the overall form of the work.

There is no upper boundary to the number of levels of structural relationships within a work. It might be that there are multiple hierarchical structural levels within a work that might encompass movements as well as smaller structural architecture. The criteria used above do not limit this and has only been distilled to these three in order to communicate the concept effectively. It is therefore possible, for example, to have movements within movements. How this is communicated to the

reader depends on the analytical tool or methodology employed by the analyst.

4.1.1.3 Form level

The form of a work is the combination of all the elements of a musical experience from individual sound events to meaningful units. Form is, therefore, meant to consider the entirety of the temporal experience of the object of study, even though many analysts might listen to the piece, or a specific section of the work, numerous times¹¹¹. However, when investigating its form the analyst will attempt to discuss a work's evolutionary shape in which earlier instances of the piece are recalled in relation to subsequent events. A discussion of a work's form can only be defined by the lower structures, the meaningful units (event and structural relationships), of the toolbox. Therefore, the *form* category within the toolbox will take an overview of the work as a whole and only concern the final overall manifestation of the work¹¹², making reference to the lower structural elements where necessary.

The word *form* is slightly cumbersome, as it insinuates a totality when discussing a work. Considering the scope of this thesis and the number of permutations an electroacoustic work might encompass, some of which might not have any defined form to speak of (specifically those works that are open-form by nature), the actual

¹¹¹ This might involve altering the playback speed of the work in order to understand complex passages.

¹¹² Whether this is defined by its duration or, for open form works, the experience of the listener.

experienced musical form cannot account for the entirety of some works¹¹³. However, one can discuss a work as the listener experiences it, even if it is somewhat vague. In the example of open-formed work the subject must define the subjective envelope for the work, but also needs to make this apparent to the potential reader as well¹¹⁴. The form level also encompasses other elements that can be related to both internal aspects of an object of study (shape) and those elements that reference the work to others (classification and compositional style):

- Shape – simply the entire temporal experience of a work as a holistic object. It takes into account all of the structural elements and sound events that ultimately form it¹¹⁵.
- Classification – the categorisation of the work within the genre, or potential sub-categories, of electroacoustic music.
- Compositional style – the compositional techniques, perhaps specific to the category of electroacoustic music under discussion, being employed by the composer.

¹¹³ This is more prevalent for those open-form works that demand audience interaction that not only define the overall form of the work, but also the internal structuring as well. Joseph Anderson's *Standing Waves at Manchester Town Hall* (1998) is an example of such a work. Audience members were placed inside of a standing wave meaning that their movement within it would affect the pitch they perceived. This is also a site-specific work, further reinforcing the fact that the concept of musical form (and even the object of study itself) cannot account or communicate the experience of the work.

¹¹⁴ This follows on from the discussion in section 3.3.1.

¹¹⁵ The overall form of a work is often decided upon by the higher level structures that shape it.

4.1.2 Overview of the perceptual toolbox framework

Figure 11 is intended to demonstrate the relationship between the three levels of the object of study (sound events, meaningful units and form) and their subsequent divisions (sonic entities and gestalt units for sound events and event relationships and structural relationships for meaningful units). The gradient between gestalt units and events relationships is intended to represent the subjectivity of the toolbox in relation to the potential differing perceptions (as outlined above). The overview is also meant to stress that criteria from lower levels can be used to describe higher levels as well. For example, spatiality might also be brought forward to the gestalt level to be used as a sub-category of proximity to describe gestalt relationships within space. Placed within this framework one might see how these criteria could be used as identifiers to discuss meta-level segments of a work.

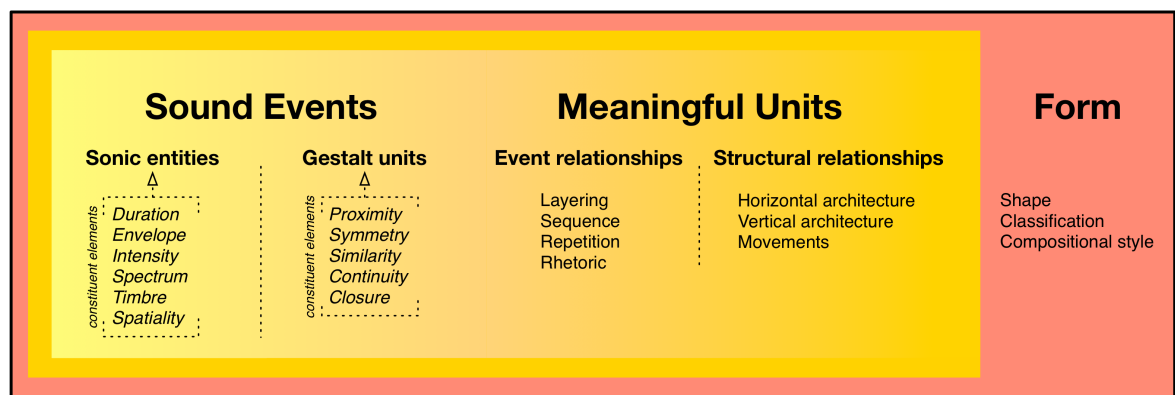


Figure 11. Segmentation of the Object of Study with individual level criteria.

4.1.3 Accounting for the aesthetic experience – allowing for subjectivity in the toolbox

The framework, as presented above, does provide a listener with a simple vocabulary to identify and segment a work into perceptual elements. Although the toolbox does not directly address meaning it is strongly inferred within the categories (particularly meaningful units) outlined above. The elements within the toolbox do not describe them any further and only hint at potential meanings or emotions that a listener or analyst might want to communicate. In effect they are only concerned with the internal structures of the work (the pertinent features of the fixity layer within the object of study) and could, therefore, be considered a formalistic approach to understanding a work¹¹⁶. By its very nature it does not consider external aspects related to a work, or indeed the referential or expressive aspects that might be evoked by certain sounds. Evidently this is just one part of the analytical puzzle, especially considering the wealth of referential possibilities within electroacoustic music categories, such as soundscapes and even some acousmatic music.

There is no effective way of adding a meaning layer within the diagram presented in Figure 11. The formalistic structure does not allow for the infinite possible

¹¹⁶ One might argue that it is also a reduced listening approach to understanding an object of study.

responses from different analysts. Rather than trying to formulate a rigid set of criteria to cover meaning the toolbox leaves the choice of investigation to the analyst. They may adopt any of the aforementioned theories of musical meaning and emotion outlined in section 2.2.3, or another not covered within this thesis. Perception has been given precedence, as it is arguably more tangible than the potential multitude of interpretations one might have in relation to the aesthetic experience. However, more information has to be added for aspects that cannot be described by the mere perception of the work and therefore allow for the potential interpretations of sound events, meaningful unit structures and the overall form of the work. Since the toolbox only allows for some subjectivity (particularly within the differentiation between gestalt units and event relationships) further subjective criteria have been added to address this deficiency. However, the identifiers outlined above only focus on the perceptual qualities of a sound(s) and not the potential interpretations an analyst might have. Another section *aesthetic experience*, along with a selection of subjective criteria, has been added to the toolbox to address this shortfall. The criteria found within focus on elements not only related to the perceptual qualities of a work, but also understood extrinsic elements as well. Many of the criteria have been formed from the extensive writings of Smalley, dealing with his investigation into: indicative fields (1996), surrogacy (1997) and source bonding (1994). Other elements, not covered by

Smalley¹¹⁷, have been formed with other terminology from other sources.

The aesthetic experience is split into three main areas: reference, expression and context; each with its own sub-criteria. Like the individual level criteria outlined within the object of study these terms are not autonomous¹¹⁸ and have been separated to not only allow the analyst a means to focus on certain aspects of subjectivity, but to also effectively document the extent a tool investigates these areas.

4.1.3.1 Reference

The phenomenon that dictates if a sound (or collection of sounds) point to (or lack) a recognised source-cause and, if recognised, whether the sound(s) in question has cultural significance. Three main concepts have been identified within the reference category to account for all the possible referential possibilities within electroacoustic music: source bonding, surrogacy and transcontextuality.

- Source bonding – described by Smalley (1994: 37) as “the natural tendency to relate sounds to supposed sources and causes, and to relate sounds to each other because they appear to have shared or associated origins”.

Within the toolbox it refers to those sounds, or collections of sounds, that

¹¹⁷ The terminology adopted by Smalley still only concerns the perceptual elements of a work and does not address extrinsic contextual aspects unless beyond referential or inferred characteristics of sounds or sound structures.

¹¹⁸ For example gesture and source-cause have a particularly close relation, as knowing the cause of a sound might impact one’s emotional response.

have referential value as an identified source-cause relationship. It not only considers the causality of individual sound events, but also how sound events might be linked together because of their apparent association.

- Surrogacy – “is particularly important for acousmatic music where the sources and causes of sound-making become remote or detached from known, directly experienced physical gesture and sounding sources” (Smalley 1997: 112); especially useful when dealing with abstract or manipulated sounds. Obviously there is considerable correlation with source bonding, but in this instance the separation is intended to highlight those tools that investigate third-order, “inferred or imagined” gestures (Smalley 1997: 112), and remote surrogates, “gestural vestiges” (Smalley 1997: 112).
- Transcontextuality – the concept that a sound, if still recognisable to the listener, might have cultural significance to those who know its origin¹¹⁹ and, potentially, its intended meaning within that paradigm. Thus two meanings are created once such a sound is used within an electroacoustic work: “one derives from the original, natural or cultural context of the event; the second meaning derives from the new, musical context created by the composer” (Smalley 1996: 99).

¹¹⁹ The recognition of a sound's origin has many meanings as outlined by Emmerson (2013): recognition of a sound source (i.e. a clarinet, which could have significance within some cultures) and the recognition of a cultural placement of that sound (i.e. a clarinet is used to play a national anthem). These two understandings can illicit very different responses.

These are archetypal and can vary depending on the listener's background and cultural understanding. It is clear that, from a listener's point of view, a sound cannot be understood through source bonding and deal with surrogacy¹²⁰. There are of course orders of surrogacy as outlined by Smalley to account for those sounds that have clear referential attributes and those that might be mimetic in quality. However, it is necessary that the sounds have some referential aspects in order to be transcontextual in nature; pointing to a culture significance. Figure 12 below shows the relationships between these criteria.

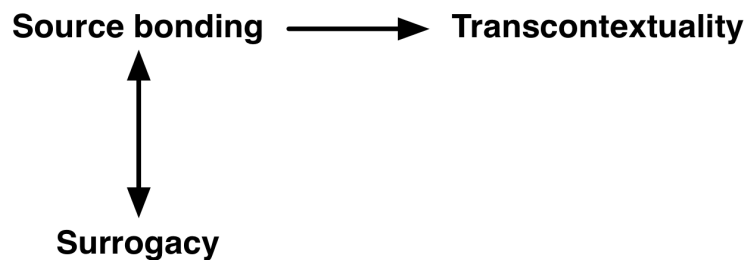


Figure 12. Reference criteria relationships.

Whereas one listener might know the cultural significance of a particular sound another might not. Similarly one listener might recognise the sound and its suggested cause from its characteristics and have an emotional response based on that, whilst another may have a completely different reaction since they do not

¹²⁰ That is to say if a sound has a recognised origin then it cannot at the same time be considered for its potential surrogate properties.

recognise the source¹²¹.

The sounding materials within a composition cannot be solely or even primarily self-referential. The apprehension of musical content and structure is linked to the world of experience outside the composition, not only to the wider context of auditory experience but also to non-sounding experience (Smalley 1996: 83).

It is assumed that an analyst might have the advantage that they can research the work through its poietic creation and find the answers to any ambiguities in sound recognition. This would of course have an impact on the emotion response and, therefore, should be documented by the analyst.

4.1.3.2 Expression

A sound event is an ambiguous descriptor for a perceptual element within a musical work. It does not distinguish between any of the types of sounds one might encounter within a work and their potential expressive nature. To account for these aspects of sounds another set of criteria have been defined under the heading *expression*. Three archetypal terms, used extensively within the field of electroacoustic music, have been utilised to denote those tools that deal with the expressive nature of sounds and their potentially evocative nature. They are: gesture, texture and utterance.

- Gesture – Smalley (1996: 84) notes that gestures “involve a human agent who [...] acts physically on sounding bodies [...] harnessing energy and

¹²¹ It is also true that they might not have an emotional response to a sound even if they do recognise it.

motion through time”. However, Smalley (1996: 85) does go on to state “in music there is a link between the energy-motion trajectory and the psychological apprehension of sounding contexts even when physical gesture is not present”. This is particularly important for electroacoustic music, specifically those musics where the sounds might have obscure or imperceptible origins¹²². Gestures within the toolbox are the combination of all the sound event criteria into one concessive unit of expression. The inclusion within the toolbox allows for subjective responses from the listener as to how these sounds might impact emotionally and give rise to interpretations between different auditors.

- Texture – Smalley (1997: 113) states that if a sound “is too weak or if they become too slowly evolving [listeners] lose the human physicality”, thus they become textural sounds. The potential expressive nature of the sound as a direct result of a human agent diminishes. However, this does not mean that textural sounds are less evocative than gestures, rather the focus of their potential expressive nature changes. Whereas the listening focus for gestures is often on the “inner details (in so far as they exist)” textures promote “internal activity at the expense of forward impetus” Smalley (1997: 114).

¹²² Two distinct types of gestures are defined to account for these difference: *performed gestures*, gestures that sound because of a human agent bringing them into action (often confirmed with visual stimulus); and *recorded gestures*, where the action of the human agent is instituted through what Smalley (1996: 84) terms the “energy-motion trajectory”.

- Utterance – “The fact that the sounds of utterance are generated from within the body, and that they are the essential vehicle of personal expression and communication, makes utterance intimate and emotionally charged. Therefore the listener’s relationship with utterance is often reflexive rather than indicative” Smalley (1996: 86). The difference between gestures and utterances is that the source-cause is understood as being the action of expression from a human agent when they are themselves the sounding body¹²³. Because it is a humanly generated sound it can be both live and recorded, as listeners will ultimately make the connection to a human utterance regardless of any visual correlation.

A complete distinction between gesture and texture may not be possible because of course textures do have an end and, therefore, have shape. At certain timescales the shaping of a texture might have gestural qualities, just as the internal workings of a gesture might have textural features. Again this is dependent on the listener’s perception whether they hear a sound to be a gesture or a texture. Although it could be argued that through analysis a likely interpretation of a sound (whether it is a gesture or texture) could perhaps be concluded depending on its relation to other sounds and context within the work.

¹²³ The word *utterance* within this thesis is not used literally and can encompass any kind of expression that originates from a humanly generated sound. This can range from singing, speaking or even paralinguistic features.

There is clearly a strong relation between *reference* and *expression*. One cannot differentiate between a gesture and an utterance without it, since in recognising an utterance one immediately understands a sound's causality, whereas a gesture can potentially have surrogate tendencies¹²⁴. Textural sounds can also exist within nature (such as the rustling of leaves or the sound of the ocean), but because of their potentially prolonged features (and their gestalt attributes) we hear them texturally and not as individual sound events. So, the question might be: how do these criteria relate to the object of study? Figure 13 shows the relationships of the expressive criteria against the perceptual identifiers within the object of study.

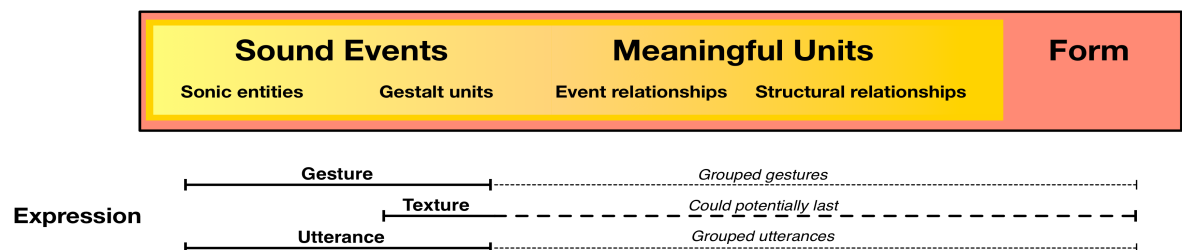


Figure 13. Expression criteria against the object of study's perceptual criteria.

The simple response is that all the expressive criteria rest within the sound event category, as gesture, utterance and even texture are understood as individual sounds. A collection of gestures and utterances can form together to create meaningful relationships and, as discussed in section 4.1.1.1.2, a textural sound

¹²⁴ Of course a gesture can have a known origin, such as sound originating from an instrument. The distinction between a gesture and an utterance is that a gesture does not derive from a human agent who is him/herself the sounding object.

could potentially last the entire piece.

4.1.3.3 Context

Context is the final category within the aesthetic experience. Whereas both *reference* and *expression* are concerned with aspects emanating directly from the musical experience, pointing outwards to issues relating to causality and cultural understanding; *context* concerns those aspects that are both intrinsic and extrinsic in nature and impact on the emotional response of the listener. Not all of the contextual elements from Figure 8 (the *contextual information diagram* in section 3.3.2) have been used as archetypes within this category. Instead the focus is on those contextual elements that have a direct influence on the aesthetic experience, usually concerning those elements that impact the performance.

- Performer/interpreter – individual performance style of the performer/interpreter, singling he/she from others. This is of particular interest for works that are scored and require a large amount of interpretation, such as Cage's *Fontana Mix* (1958).
- Place and space – play an integral role in some electroacoustic musics, particularly those that are site-specific in nature. The place of the performance for these types of electroacoustic musics are not just a space in which the performance takes place, rather they are a fundamental part of the work (which if extracted from the specified environment would lose some of its essence). The word *place* in this instance refers to the identity and

context surrounding the environment, whereas *space* concerns the acoustic and physical aspects of the surroundings, perhaps for performance and installation purposes.

- Part of a series – important when considering works that form part of a grander oeuvre. The impact of the section if extracted or considered within this oeuvre is of particular importance to the analyst and indeed the reader.

4.1.5 The multi-criteria framework

To cross-examine the existing analytical tools the criteria listed above have been organised into a multi-criteria intelligence matrix (see Figure 14). With this a potential analyst can decide which tools would be more suitable depending on their analytical intentions. It can also be used to identify where there might be potential gaps within the field for the development of new tools.

	Sound Event						Meaningful Units				Form	Aesthetic experience																		
	Sonic Entity			Gestalt Unit			Event Relationships		Structure Relationships			Reference	Expression		Context															
Level Criteria	Duration	Envelope	Intensity	Spectrum	Timbre	Spatiality	Proximity	Symmetry	Similarity	Continuity	Closure	Layering	Sequence	Repetition	Rhetoric	Horizontal Architecture	Vertical Architecture	Movements	Shape	Classification	Compositional style	Source bonding	Surrogacy	Transcontextuality	Gesture	Texture	Utterance	Performer/interpreter	Place and space	Part of a series
Analytical Tools																														

Figure 14. The multi-criteria intelligence matrix for cross-examining analytical tools.

Other supplementary information needs to be added to the multi-criteria

intelligence matrix to document the contextual information of the analytical tools themselves. This includes: the application of the tool (whether it is intended to be written, visual or multimedia); the analytical focus (production, reception or both); and the listening conditions, if necessary, for the tool (reduced listening for example)¹²⁵.

An analyst might set about defining which criteria are relevant in a number of ways when using the multi-criteria framework. For example, if an analyst wants to gain a better understanding of the sound events within a work, perhaps due to the nature of their characteristics within a work or their referential or expressional qualities, then he or she would most certainly choose a tool that covers the necessary criteria within either the sound event section, or within the aesthetic experience level. If the analyst prefers to investigate the structural levels within a work, specifically those that are micro rather than macro, then they would probably choose a tool that covered the criteria listed within the event relationships level. Although the chosen tool would more than likely cover the necessary elements within the work it might require that the analyst employ a specific approach (such as reduced listening for typo-morphology) or a particular means to communicate the investigation, be it written/verbal, visual or multi-media. Therefore, the analyst must consider how appropriate the tool they have found is for that particular work

¹²⁵ This will be demonstrated in figure 15 in section 4.2.1.7.

and if it effectively investigates and communicates his or her analytical aims. It might be that the analyst might need to employ more than one analytical tool in order to achieve this.

4.1.5.1 Scoring system

Left as it is the multi-criteria matrix can only indicate which of the level criteria a tool covers. A scoring system is applied in order to note the extent in which the tools are relevant to given criteria. To avoid confusion a simple numerical grade has been added to the matrix, ranging from 1 (if it merely mentions the criteria in question) to 3 (covers this criteria to a great degree). The full scoring system is provided below. Examples of its application can be found in the subsequent section (4.2).

How much it address the criteria	Corresponding score
Not at all	0
Bare minimum	1
To some degree	2
A lot	3

Table 1. The scoring system within the electroacoustic toolbox.

The number 0 is used in those instances where the tool is either an extension or subsidiary to another one and negates a criterion from the principal one. Examples of this can be found in section 4.2.1.7 in the following subsection. An 'X' is used in instances where the toolbox requires a simple binary response, such as the additional criteria.

4.2 Application of the toolbox

As stated in the previous section there are two main ways in which the toolbox can be applied in the analysis of electroacoustic music. The first is the cross-examination of current (and potential future) analytical tools. The second is as identifiers for segmenting the work into discrete units for discussion. Examples of both of these applications will be given in this part of the chapter to highlight how one might apply the toolbox in both these ways. First, a number of tools will be integrated into the toolbox and then cross-examined with one another to highlight their scope and potential range. Finally, the first three minutes of Denis Smalley's *Wind Chimes* (1987) will be segmented using the criteria within the toolbox to demonstrate how it can be implemented as perceptual identifiers.

4.2.1 Demonstration of how analytical tools work within the toolbox

This section will apply separate analytical tools (all of which have already been discussed in section 2.3) to the electroacoustic toolbox to show how they can be placed within the framework outlined in section 4.1.1 (sound events, grouping units or form). Some of the tools will comply with criteria predominantly within a particular section of the framework, whilst others will cover a larger range of criteria but at the cost of depth (examples of this will be provided in this subchapter).

The tools discussed within this section have been chosen as they cover the majority

of criteria listed within the toolbox (to a some extent). Obviously there are many other tools one could cross-examine, but these ones in particular aptly demonstrate the application of the toolbox.

4.2.1.1 Schaeffer's *typo-morphology* (1966) within the electroacoustic toolbox

The focus of *typo-morphology* is on sound objects; therefore it does not stray too far away from the criteria within the sound event division within the toolbox. Schaeffer even stated that another *traité* of similar length would need to be written in order to discuss the grouping units of his *soflège* (Schaeffer 1966: 663). This is further highlighted by the typology grid (Figure 5 in section 2.3.1) and the *typo-morphology* recapitulation summary (Figure 6 in section 2.3.1) in which all sound objects are either: an impulse, iterations or sustainment of sound (which would only reach the gestalt level within the electroacoustic toolbox). Therefore, *typo-morphology* does not consider how sounds relate to one another, or indeed higher structural relationships¹²⁶. Regardless, the *typo-morphological* framework provides the most extensive look at the sound event level when compared to other tools listed within this section. It takes into consideration many factors relating to individual perceivable sound events, both sonic entities and gestalt units. The tool covers all but one criterion related to the sound event level: that criterion being

¹²⁶ It does, however, consider the internal elements, which might either be *composed* or *composite* as described in section 2.4.1.

spatiality¹²⁷.

Within the additional information section of the toolbox it has been recorded that it requires a reduced listening strategy in order to be applied to a work. This means it is entirely focused on the perception of the listener. Furthermore, it does not consider the referential, expressive or contextual aspects that might be relevant to a work.

4.2.1.2 Smalley's *spectromorphology* (1986, 1997) within the electroacoustic toolbox

As stated previously in section 2.3.2 there is some correlation between spectromorphology and typo-morphology; that is they both principally focus on the sound event level¹²⁸. There are, however, some minor differences with what they cover regarding the criteria within the electroacoustic toolbox. Whereas typo-morphology has a stronger emphasis on sonic entities and gestalt unit criteria, spectromorphology does investigate low-level event relationships, particularly within the *behaviour* section of the morphology framework, as it deals with archetypal aspects of a work¹²⁹ (Smalley 1997: 117). It is also the only section that has specific terminology relating to structural relationships whilst others use the

¹²⁷ In the time of writing his *Traité* the idea of spatiality being used as a compositional element within a work was not a prominent concern for component for electroacoustic composition.

¹²⁸ In principle, however spectromorphology does consider how sound events might work together.

¹²⁹ Which could also be considered as rhetoric within the electroacoustic toolbox.

same terminology to describe all levels within a work¹³⁰. Furthermore, the focus of spectromorphology seems to be on horizontal relationships, since much of the discussion is on expectation and motion. The one major exception to this is in the *behaviour* section where the concept of motion coordination (vertical synchronisation) is introduced (Smalley 1997: 118)¹³¹.

It could be argued that typo-morphology provides a more in-depth look at the sound event (of course within the context of the sound object), whilst spectromorphology has a broader focus that considers how these sound events might function within a work. Similarly to typo-morphology, spectromorphology does not consider spatial features of a sound¹³². This is left to the spatiomorphology extension, as outlined in section 2.3.3.

Spectromorphology, if used as an analytical tool, is a list of descriptive terminology designed to provide specialists with words to express what they hear. It is in no way considered a vernacular and the literature surrounding the concept is dense and intricate. Therefore, one is able to use the meta-criteria defined within the toolbox to cross-examine and identify what the tool covers.

¹³⁰ Smalley (1997: 115) does state that the *onset, continuants and terminations* terminology can also be applied to higher level musical structures, whereas motion and growth lead to expectation (1997: 116) rather than specifically stating their function within a given work.

¹³¹ Which arguably does not go past the event relationship level, no more so than the *onset, continuants and terminations* terminology does.

¹³² It does, however, consider spectral space within a work (Smalley 1997: 121).

The language used within the *onsets, continuants and terminations* (Smalley 1997: 115), *motion and growth processes* (Smalley 1997: 116) and the *seven characteristic motions* (Smalley 1997: 117) all provide expressive terminology for describing gestural elements within a work, particularly in relation to the “energy-motion trajectory” (Smalley 1996: 84). The terminology is expressive enough to allow for potential varieties in interpretation by different listeners on the same gestural sound. A subset of criteria, found within the *texture motion diagram* (Smalley 1997: 118) presents criteria that could be used to imply different emotional responses, although not to the extent as the aforementioned criteria focused on gestural sounds.

4.2.1.3 R.M Schafer’s *Classification* (1977) within the electroacoustic toolbox

Whereas both typo-morphology and spectromorphology investigate a sound event as a discrete entity Schafer’s classification system cross-examines sound events within the same piece¹³³. It does not provide as much information on the sound event as both typo-morphology and spectromorphology. Instead the notation and typological symbols provide a basic framework for perceptual coherence through the application of the *description of a sound event* diagram (Schafer 1977: 136).

¹³³ The application of Schafer’s classification is also different. Unlike typo-morphology and spectromorphology, which are language-focused tools, it uses a mixture of notation and typological symbols to describe a sound event’s characteristics.

However, its investigation into sources of sounds provides the most extensive organisation of terms not found in any other tool examined here. It therefore scores highly in both source bonding and utterance¹³⁴, whilst also addressing some issues of cultural sounds within the *sounds and society* section (Schafer 1977: 141), hinting at the possible transcontextual issues that might arise from region-specific sounds. It also considers the place of the sound within the *setting* criteria (Schafer 1977: 135) where reverb times and distance of the sounding object can be noted.

4.2.1.4 Roy's *Grille fonctionnelle* (2003) within the electroacoustic toolbox

As stated in section 2.4.5 Roy's *grille fonctionnelle* is the first notation tool that focuses solely on structure within a given musical work. It considers all aspects of structure (both horizontally and vertically) and both event and structural relationships. Furthermore, the notation system, through the rhetoric functions, begins to hint at a compositional style of the work and that of the particular composer one is investigating (Roy 2003: 349). Although the tool does not consider the referential, expressive or contextual elements of a work it does allow for potential interpretations of sound organisations and their potential impact on

¹³⁴ Many different types of utterances are documented within the *human sounds* section (Schafer 1977: 141) and Schafer does also consider the utterances of animals within the *natural sounds* section (1977: 140).

different listeners¹³⁵.

Once again it does need to be applied to some form of score that segments the work into discrete sound events. Therefore, this tool needs to be used in conjunction with some other form of analytical tool, one that identifies the sound events within a work.

4.2.1.5 Giomi and Ligabue's *Aesthetic-Cognitive Analysis* (1998) within the electroacoustic toolbox

The aesthetic-cognitive analysis framework takes into consideration many aspects of the work that cover all three levels of an object of study (sound events, grouping units and form). It is itself a methodology for analysing an electroacoustic work by adopting similar strategies that can be found within other tools listed here. For example, it shares a similar system of notating sound events as Schafer's *classification* methodology (Giomi and Ligabue 1998: 126), albeit to a less deep but wider extent¹³⁶. Furthermore, the *structure level* diagram (Giomi and Ligabue 1998: 135) is formalistic in nature and seems to rest solely on one level without

¹³⁵ Since this does not relate to any of the expressive archetypes (reference, expression or context) it cannot be noted within the toolbox. However, as stated in section 4.1.3, the potential meaning that could arise from the perceptual framework is strongly inferred, specifically in relation to the meaningful units section (which the *grille fonctionnelle* tool covers extensively).

¹³⁶ The descriptions possible within Schafer's classification system are much more expressive compared to those possible within the aesthetic-cognitive analysis framework, as the analyst is often only presented with a choice of predetermined archetypes that negate the potential subtle differences between similar sounds.

considering the potential vertical architecture that might exist. By covering such a wide range of criteria it sacrifices the depth that other tools go into that focus on one particular level of the object of study.

4.2.1.6 Emmerson's *Language grid* (1986) within the electroacoustic toolbox

Emmerson's language grid, as stated in section 2.3.7, considers a musical work in its entirety, that is within its application¹³⁷. It is particularly concerned with the referential and internal meanings that can be found within a given work. The application is a holistic view of the work by identifying it within a 3x3 grid of possible musical outcomes. Because of this it also considers the compositional style and the classification of the work as well. It is the only tool that focuses entirely on the totality of a work.

4.2.1.7 Overview of tools within the multi-criteria intelligence matrix

Below in Figure 15 all the tools listed above have been applied to the multi-criteria intelligence matrix. It is clear from the table that no one tool covers the entire scope of the object of study. In fact the more a tool covers within the toolbox the less depth it goes into for the individual criteria¹³⁸.

¹³⁷ In order to come to an overall understanding of a work the language grid considers it in its entirety, both in its construction and potential referential criteria. It just so happens that within the application, outlined by Emmerson, that he categorises a piece by its discourse and then by its syntax.

¹³⁸ A larger version of figure 15 can be found in appendix 1.

	Sound Event					Meaningful Units					Form	Aesthetic experience					Supplementary information					
	Sonic Entity			Gestalt Unit		Event Relationships			Structure Relationships			Reference		Expression		Context	Application			Analytical focus		
Level Criteria																						
Analytical Tools	Duration	3	3	3	3	3	3	3	3	1	1											
	Envelope	3	3	3	3	3	3	3	3	1	1											
	Intensity	3	3	3	3	3	3	3	3													
	Spectrum	2	3	2	2	3			1	2		1	1									
	Timbre													2	1							
	Spatiality																					
	Proximity																					
	Symmetry																					
	Similarity																					
	Continuity																					
	Closure																					
	Layering																					
	Sequence																					
	Repetition																					
	Rhetoric																					
	Horizontal Architecture																					
	Vertical Architecture																					
	Movements																					
	Shape																					
	Classification																					
	Compositional style																					
	Source bonding																					
	Surrogacy																					
	Transcontextuality																					
	Gesture																					
	Texture																					
	Utterance																					
	Performer/interpreter																					
	Place and space																					
	Part of a series																					
	Written																					
	Notational																					
	Table/Graphical																					
	Transcription																					
	Evocative																					
	Production																					
	Reception																					
	Both																					

Figure 15. Analytical tools (listed above) applied to multi-criteria intelligence matrix (a larger version can be found in appendix 1).

4.2.2 Example of level segmentation using Denis Smalley's *Wind Chimes*

It should be reiterated before commencing this section that this is the author's application of the toolbox criteria to the first three minutes of *Wind Chimes* (1987). Other people might have a different opinion and indeed perspective on the work, especially when concerning higher structural relationships and whether a collection of sounds is considered a gestalt unit, or a collection of discrete sonic entities forming an event relationship. Furthermore, this is a reduction of the potential structural relationships found within *Wind Chimes*, particularly at the structural relationships level¹³⁹. The aim of this section is not to give an analysis of the first three minutes of *Wind Chimes*; rather it is to demonstrate the application of the criteria to a particular work. It is also important to note, once again, that the criteria should not be used as an analytical tool, rather as identifiers to discuss aspects of

¹³⁹ This is not only because of a choice on the part of the author, but also as the scope of the analysis is only on an extract of a much larger work. Larger structural considerations might affect this particular segmentation.

a work. Analytical tools would need to be applied in order to gain a deeper understanding beyond simply identifying the individual sound events and their basic relationships with one another. Moreover, the criteria only demonstrate how one might segment a work and do not uncover other aspects such as perception or interpretation.

Some might consider the application of the toolbox criteria as identifiers to be an analysis of the neutral level of *Wind Chimes*, as outlined by both Nattiez (1990; 156) and Roy (2003: 201 translated by Gatt 2014) who states “the primary purpose of an analysis of the neutral level is to segment the work into morphological units in order to realise a transcription of the work”¹⁴⁰. However, this is not the case. The difference between the two is that an analysis of the neutral level does differentiate between sound events based on their characteristics, whereas the toolbox criteria only label them as being either a sonic entity or gestalt unit. It therefore does not differentiate between separate sonic entities or gestalt units within a work. It is also different to Hirst’s analysis of *Wind Chimes*, documented within his book *A Cognitive Framework for the Analysis of Acousmatic Music: Analysing Wind Chimes* by Denis Smalley (2008), as although he does first segment the work perceptually into sound events he then continues to apply his analytical

¹⁴⁰ A *transcription* in this instance is the segmentation of the work into pertinent sound events and structures without defining their significance or analysing their impact.

methodology to it¹⁴¹.

Wind Chimes has been chosen as it is a fixed-media acousmatic piece that can be easily found through numerous releases. It is, arguably, a recognised work of this particular category of electroacoustic music, one that many of the potential readers will already know. Also *Wind Chimes* presents a great number of examples sounds within the first three minutes that could be interpreted differently by different analysts. Thus, it demonstrates a lot of the fundamental dilemmas when applying the electroacoustic toolbox framework and criteria as identifiers.

4.2.2.1 Process of applying the criteria to *Wind Chimes*

This segmentation of the extract of *Wind Chimes* was formed perceptually from a bottom-up listening orientation. Individual sound events (both sonic entities and gestalt units) were first identified before considering event relationships and finally structural ones. Form has been noted on the overview (Figure 16) and in appendix 2, but is only highlights that this is the form of this extract and that an analyst does not have to analyse an entire work (as Roy did in section 2.4.4)¹⁴². It is, in fact, through the various subsidiary levels that shape form (and potentially compositional style) is defined.

¹⁴¹ Within his book Hirst outlines the SIAM (Segregation, Integration, Assimilation and Meaning) framework where segmentation is only the first step in applying the methodology.

¹⁴² It does not say anything about the work, merely that there is a perceptual form in the three-minute extract.

4.2.2.2 Comments on the application of toolbox criteria to *Wind Chimes*

The sonic entities are very pronounced within *Wind Chimes* acting as indicators for a change in the overall flow of the work¹⁴³. This means they are easily identified and probably universally understood as being discrete sonic entities. There are, however, a number of occasions within the work where one could potentially hear a group of individual sonic entities, or, because of their close proximity and similarity, perceive them as a gestalt unit. One such instance occurs at 0'12" (just after a clear wind chime attack) and continues until 0'28"¹⁴⁴. This sound source is a conglomerate mass of wind chimes being struck in close succession. Perceptually it is clear that this mass of sound is made up of somewhat distinct wind chimes. However, within the listening flux, one might struggle to hear them as distinct sonic entities. Therefore, these sections within the work have been sectioned as being either individual sonic entities or gestalt units. It really does depend on the listening orientation of the listener.

Structurally there appeared to be two main structural sections within the extract: 0'00" to 0'40" and 0'41" to 2'56". The choice for defining this divide was because of the change in sonic material and its use within the composition. The first section,

¹⁴³ Many of the distinct sonic entities are used within the piece to signify changes both at the event and structural level of the work. This will be discussed in more detail in the next paragraph.

¹⁴⁴ The other occasions where this occur happen at 1'07" to 1'25", 1'25" to 2'05" and 2'04" to 2'54". However, these occur in what has been defined as section 2 and will be discussed in the succeeding paragraphs.

as seen in the overview (Figure 16), contains the most sonic entities within the entire section. Event structures are then formed from these distinct sonic entities. There is also only one occasion where a potential gestalt unit might emerge (0'12" to 0'28")¹⁴⁵. Within this first forty seconds there are two instances of the call and response rhetoric (one occurring at the beginning of the piece and another at 0'28") and a crescendo defined by a succession of wind chime attacks forming an *accelerando* (0'20" to 0'36"). It is at the end of the second call and response that the second section begins.

Unlike the first defined section the second focuses more on the manipulation of wind chimes rather than using them as sonic entities to define event relationships. Individual sonic entities are still used (only three times including the final response in the closing of section 1); however, their function has shifted to define larger structural relations rather than forming event relationships themselves. Section 2 is also the first time that a convincing gestalt unit is found (the first one happens at 0'41" just after the initial wind chime attack to announce the section). The focus is now on evolving material, meaning that event structures take longer to unfold in comparison to section 1. Again there are instances where one might perceive a mass of sonic entities or a single gestalt unit (1'07" to 1'25", 1'25" to 2'05" and 2'04" to 2'54" where the sound of the wind chimes seem to amalgamate together

¹⁴⁵ As discussed above.

through sound transformations), but these might still be perceived as gestalt units because of the close proximity of the individual manipulated wind chime strikes.

4.2.2.3 Overview of segmentation

The overview of the work, provided in Figure 16, shows the events and sections discussed above. The table below denotes the colours used to define the elements within the work.

Criteria level	Colour
Sonic entities	Yellow
Sonic entities or gestalt units	Light orange
Gestalt units	Orange
Event relationships	Dark orange
Structural relationships	Red-orange
Form	Red

Table 2. Colour key for the application of criteria levels within the toolbox as identifiers to *Wind Chimes*.

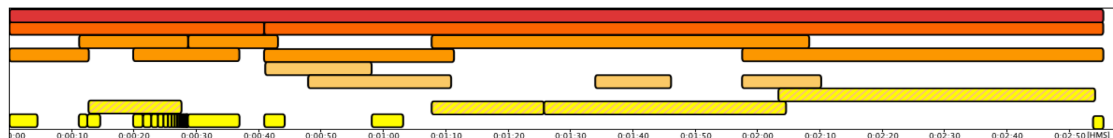


Figure 16. Overview of segmentation of the first three minutes of *Wind Chimes* using the electroacoustic toolbox criteria.

It is important to comment that there does not need to be a complete overlap with subordinate structures when compared to superior ones. The example of *Wind Chimes* presents many occasions where event structures overlap with one another and with structural relationships as well. This might indicate that there are larger

movements, within this work as whole and not just this extract.

4.2.2.4 Potential aesthetic responses to *Wind Chimes*

Without resorting to the exact emotional responses felt by the reader one can only refer to generalities. *Wind chimes*, as the name suggests, is a piece made mostly with the sound of resonating wind chimes. For this reason these sounds might have personal significance to listeners related to their own history or cultural understanding. For example, in some cultures wind chimes are believed to ward off evil spirits. This might evoke an ominous sonic environment, particularly when the sounds of the wind chimes transform into otherworldly sounds, leading into issues related to surrogacy. However, for those listeners that do not make this connection the sounds of wind chimes might evoke a pleasant memory, generating an entirely different response.

One cannot comment on the potential contextual elements of the work. Without an interpreter to diffuse the work an analyst can only work with the fixed musical object of study, removing any potential performative aspects that might influence a listener's apprehension. Furthermore, the work is not considered to be part of a greater oeuvre and is not site-specific in nature.

4.3 Limitations and criticisms of the toolbox

A lot of the shortcomings of the toolbox have already been hinted at in the previous sections, particularly in section 4.2. This final short section aims at clarifying the intended scope of the toolbox and its inherent limitations. It would therefore be pertinent to start by addressing any misconceptions regarding the toolbox's intended scope. The toolbox is not:

- intended to be an analytical tool or methodology itself;
- meant to limit one's language when analysing or discussing a work¹⁴⁶;
- concerned with poietic aspects of the object of study, only those aspects that rest within the fixity layer¹⁴⁷ or those contextual elements (outlined within the context category) that have a direct impact on the apprehension of a work;
- limited to only fixed media works¹⁴⁸;
- aimed at demonstrating the subtle differences between analytical tools, only the general differences from an overview;
- fixed, and can therefore accommodate new criteria with which to cross examine analytical tools¹⁴⁹.

¹⁴⁶ The criteria within the toolbox are only intended to be used as identifiers for both perception and the aesthetic experience.

¹⁴⁷ The musical pertinences of a fixed media document (if provided) or notable features of a score, transcription or written account.

¹⁴⁸ The inclusion of the aesthetic experience categories is intended to expand the scope of the toolbox to other forms of electroacoustic music, rather than focusing on acousmatic works.

¹⁴⁹ The criteria presented within the toolbox are by no means considered a definitive list and should allow for new entries when necessary. Particularly when new forms of electroacoustic music arise.

There are a number of criticisms one might state in relation to the toolbox and its application, some of which will be discussed and countered below.

4.3.1 Atomism vs. holism

The attempt to explain and understand music as a succession of separable, discrete sounds and sound complexes is the error of atomism [...] for the tested pleasure-displeasure reactions are not what most psychologists tacitly assumed them to be: they are not universals (good for all times and all places) but products of learning and experience (Meyer 1956: 5).

The toolbox, by its very nature, is the atomisation of a work into discrete parts. In doing so the holistic experience of the music is maybe lost, unless one focuses on the form of the work. It is an unapologetic dissection of a work, reducing it to a mere object of study for further investigation and understanding. It is also unapologetic about the way it cross-examines analytical tools, all of which have their own methodologies and means of application. Provided that the analyst understands this then there can be no confusion that this process does not equate to the holistic experience of a work¹⁵⁰. However, it should be reiterated that the analytical process does not end at the *investigation* part of the process of analysis. Analysis is, after all, a perspective on a work, one that is already falsified once it is taken out of the listening flux. The toolbox is not advocating that the understanding of a musical work comes through the segmentation of its perceptual elements only.

¹⁵⁰ The inclusion of the aesthetic experience categories is meant to alleviate some of these shortcomings.

Indeed when forming coherence one is, in effect, synthesising all of the elements together they deemed fit based on their objectives of study.

4.3.2 Universal not specialist

As many of the terms within the toolbox are not specific for any particular category of electroacoustic music they become universal. The trade off is that they, as previously stated, do not describe elements within a work any further than simply identifying them. Unlike a specialist language that could communicate aspects of a work in more depth the toolbox criteria is ambiguous in its design. It is meant to allow for different applications between listeners based on their individual perception and understanding and does not provide a definitive answer to a work. Furthermore, the criteria itself cannot distinguish between subtle differences in sounds of the same level. It can only identify them as being individual entities or a grouped unit (depending on the listeners perception)¹⁵¹.

4.3.3 Esthetic not poietic – emphasis on listener perception

The toolbox, by its very nature of being listener centric, does not consider any of the poietic information that might have been created by the composer(s) throughout the creative process or within his or her writings. Its function is not to

¹⁵¹ For example the identifiers cannot explain the difference between two sonic entities, only that they are both considered to be sonic entities. However, in applying tools that investigate a sound's perception or aesthetic experience one might be able to provide an answer to these subtle differences that might occur.

prove or disprove the composed meaning behind a work, only to allow analysts to communicate a perspective by using the identifiers, or to choose the appropriate tool based on their analytical objectives. The importance of the composer's intentions are not intended to be diminished within the toolbox, rather the purpose is to allow for other interpretations of the work. This can be particularly troublesome for some musics, particularly those that have complex algorithmic design, which might not be perceptible to the listener.

4.3.4 Hierarchical nature of the toolbox

As stated in section 4.1.1 there exists a hierarchy that dictates that criteria found within lower levels can be used within higher levels of the perceptual object of study. Some analytical tools have adopted similar strategies, most notably spectromorphology (Smalley 1997: 115), where terms used to describe lower level events can be reused to describe sound relationships. Smalley (1997: 114) does continue by stating there “is no permanent type of hierarchical organisation for all electroacoustic music, or even within a single work”. One might be confused thinking that the toolbox is imposing a rigid hierarchical structure to all electroacoustic music. However, this is not the case. The hierarchical nature of the toolbox is entirely open to the subjective perception of the listeners. This is highlighted by the gradient between gestalt units and event relationships. The intention is that the listener can impose their own hierarchy on a work depending on their own perception and interpretation. The language used within the toolbox is

intended merely to provide identifiers that offer a listener the means to pinpoint elements of interest.

4.3.5 The esthetic codification of electroacoustic music

The toolbox criteria have avoided the potential “esthetic codification” of electroacoustic music, argued by Varèse (1966: 18), by offering general identifiers that allow for some subjective application. In doing so one avoids codifying music, whilst still distinguishing between potentially interesting elements to form an analytical discourse. Since the identifiers cannot describe how or why an event or section functions there is no way to indicate how they work regarding their presence within a piece, or their changes in intensity as the sound progresses¹⁵². The gestalt units that occur in *Wind Chimes* (as shown in Figure 16 in section 4.2.2.3) at 1’34” to 1’46” and 1’57” to 2’10” are virtually the same sound (they share the same timbre), but have different intensities and presence within the piece (the second iteration of the sound is much louder and more prevalent than the first).

¹⁵² This is particularly relevant for gestalt units that evolve over time.

4.4 Chapter summary

What this thesis is proposing is a selection of flexible criteria that would account for not only the variations of sonic material within electroacoustic music but also the possible different perspectives, both perceptually and aesthetically. Doing so allows for common language to be formed in order to describe and segment a musical experience (or the musical pertinences of an object of study) into bite-size chunks, whilst providing meta-level criteria for defining what the current (and future) analytical tools include. It is formed from concepts within cognition, musical memory and aesthetics; therefore, its focus is on one's experience of a work. When one begins to discuss and share this experience they are effectively freezing their distinct perspective in time¹⁵³.

The toolbox represents a means to segment how one 'makes sense' of work, which to all intents and purposes has no defined compositional methodology or application. It deals with universals that have relevance to the world of perception, cognition and the listening experience. The aim is to account for the vast multitude of potential tools (beyond the ones discussed within this thesis) for analysis, whilst providing a framework to begin a dialogue with which one might begin to discuss the fundamental fabric of the different varieties of electroacoustic musics.

¹⁵³ Analysis is an act of fixing an experience of a work. Therefore, as soon as someone begins to discuss and critique a work they are removing themselves from the musical flux, which in turn is defining the boundaries of their experience of it.

A work of music is a cohesive whole, which if divided into sections loses its initial authenticity. Comparably, when one takes an object of study out of the temporal experience it falsifies it; when one segments an object of study one is moving further away from the actual experience. What might be lost in this act¹⁵⁴ is made up for in the understanding one might attain when examining an object of study in such a manner. The toolbox is listener centric and is mainly concerned with the perceptual sonic material. Obviously, when an analyst investigates an object of study in depth they are, in the process, removing him or herself from the temporal experience of the work. The outcome of the investigation of the work is fixed, so only a few potential perspectives can be presented. The toolbox, both in its identification and cross-examining of analytical tools, is intended to help analysts communicate these perspectives.

A general observation on the application of the archetypal tools within this chapter is that the more criteria the tool covers the less deep their investigation into those individual criteria. It would seem that there is a division between depth and breadth

¹⁵⁴ Of course the work still exists after an analysis, but one's understanding of it might have been irrevocably changed to that particular perspective in future listenings.

– the more a tool covers the more simplistic it is in its execution¹⁵⁵. A question might be: how might an analyst establish the optimum choice between depth and scope? The answer is dependent on his or her analytical intentions. Each analytical tool will have a certain bias either in the content it analyses, its methodology or how it communicates the outcomes regardless of its depth or scope¹⁵⁶. If the analyst prefers a universal approach to a work then a tool that covers many criteria might be more applicable to their investigation. Similarly, when an analyst has a specific section within the toolbox, or indeed a particular criterion, that they wish to analyse then an analytical tool with a defined scope will most likely be the best solution.

It has been stated throughout this thesis that there is no precedent for electroacoustic music analysis. The toolbox does not claim to offer a precedent, only a gateway to analysis. The rest of the work has to be accomplished by the analyst. The toolbox offers the tools; the analyst must perform the analytical investigation. How the analytical investigation is undertaken is up to the analyst.

¹⁵⁵ This is of course only based on the tools analysed within this thesis. There will no doubt be other tools that cover a wide array of criteria whilst investigating them in depth. These tools will certainly be specialist and multifaceted.

¹⁵⁶ All of which will shape the way the analyst will listen to the work when undertaking the analysis.

5.0 Applied research

5.1 Introduction

The intention of this section is to demonstrate how the *process of analysis* (as outlined in section 3.1.2) and the electroacoustic toolbox (detailed in chapter 4) can be used for a variety of different electroacoustic musical works. Four works will be analysed with contrasting intentions and methodologies. The four works are: Pierre Schaeffer's *Étude aux chemins de fer* (1948); François Bayle's *Toupie dans le ciel* (1979); Max Neuhaus' *Times Square* (1977); and Trevor Wishart's *Imago* (2002). While these works are not intended to cover the wide variety of electroacoustic music categories this thesis addresses (with the process of analysis and the electroacoustic toolbox); I chose a group that I felt had contrasting approaches to the object (the work) in question. This leads me to a small request that the reader tolerates the use of the personal pronoun 'I' within this section, as these analyses are *my* perspectives of these works and are in no way intended to detail any universal truth.

Each analysis will be conducted in a different fashion. The analysis of *Étude aux chemins de fer* will be a bottom-up investigation, applying Schaeffer's typomorphology to one of his earliest works. A phenomenological analysis will be undertaken with *Toupie dans le ciel*, focusing on my direct interpretation before delving into the larger structural units of the piece. For the analysis of *Times*

Square I will create a monologue of my experience of the installation, as there is no definitive object of study for the work, before analysing my experience. Finally Wishart's *Imago* will be analysed incorporating the poietic information of the compositional process and the composer's intentions.

5.2 Analysis of *Étude aux chemins de fer* by Pierre Schaeffer

I have chosen to analyse *Étude aux chemins de fer* by Pierre Schaeffer not because the piece is of particular interest to me, rather my intention is to investigate the application of Schaeffer's typo-morphology to a piece of, what was then termed, *musique concrète*. This piece seems, from the outset, particularly suitable for this type of investigation as there is no overlapping material and the sound events within the work are crudely composed together¹⁵⁷, providing clear indications of when a new sound event occurs within the piece. However, this is not a substantial reason for analysing a work, in fact it could be viewed as a self-fulfilling prophecy. That is to say if this piece is to be viewed as a study and not a “work”, then it is surely Schaeffer’s attempt to apply or investigate what might have been the conceptual origins of his *solfège*¹⁵⁸. Therefore, the second reason for my decision to analysis the work using typo-morphology is to investigate whether the application of the tool could indicate structural relationships within the work. As previously stated within both the literature review (section 2.3.1) and within the electroacoustic toolbox application section (4.2.1.1)¹⁵⁹, typo-morphology does not provide any means to analyse or communicate structural relationships within a

¹⁵⁷ This is not a critique of the piece, but rather of the technological capabilities of the time. It was, after all, one of the first examples of electroacoustic music.

¹⁵⁸ The French word *étude*, within a musical context, means a short musical composition, usually focusing on one instrument to provide an exercise or to improve or demonstrate the technique of a player. One might presume that for Schaeffer this *étude* was the genesis of what is now know as his *solfège*.

¹⁵⁹ And by Schaeffer himself (1966: 663).

work. For this reason I will be conducting a bottom-up analysis from the sound event level towards the overall form of the work. The intention is to see if structural aspects of the work can be investigated through patterns at the sound event level of a work.

For this particular analysis I have had to adopt a reduced listening approach in order to apply Schaeffer's typo-morphology to the piece¹⁶⁰. In doing so I had to ignore my potential emotional responses to the sound events and referential aspects of their origins in order to categorise them solely for their typology. The act of applying Schaeffer's typo-morphology is a lengthy task and requires one to ignore larger structures to concentrate on individual sound events and their individual morphologies¹⁶¹.

5.2.1 Applying typo-morphology

Chion (2009: 124) states that there are three stages in applying the typo-morphology framework to a work: identification, classification and description. These stages become the process of the investigation. They neatly segment the analysis into the three areas of interest concerning individually perceptible sound events: the recognition of the events, the type of the event (typology) and the inner structure of it (morphology).

¹⁶⁰ As stated in section 4.2.1.1.

¹⁶¹ The full visual analysis can be found in appendix 3.

5.2.1.1 Identification – segmenting the work

When applying the typo-morphology framework one is concentrating on sound events. *Étude aux chemins de fer* provides a multitude of different looped sounds, which perceptually, for me, sound as gestalt units¹⁶² or, using Schaeffer's terminology, iterative sounds. For this reason identifying the sound events within the work was not particularly challenging since they are clearly separated within the composition. The only occasion where there are overlaps is when there are multiple sounds within the recordings. This sometimes occurs when there is, for example, a high frequency pneumatic sound accompanied by a repetitive mechanical sound of some form of machinery (the sound event that occurs at 0'55" is one example of this where both this pneumatic and mechanical sound can be heard in unison). In instances like these some other analysts and listeners might have deemed it suitable to consider these as separate events. I however decided that the sharp and abrupt changes between individual recordings rendered any subtle layering of sounds irrelevant in the grander context of the work. Furthermore, I found that many of the prolonged sounds (mostly iterative in nature) were grouped together perceptually because of their gestalt properties, making them gestalt units. Many of the repetitive mechanical sounds registered highly with

¹⁶² My view of the events within this particular analysis follows Emmerson's (2008) first definition of an event (discussed in section 4.1.1.1) that an event is "an identifiable change in a given quality, taking place at a specifiable time". Therefore, I do not concentrate on the micro-morphologies of a sound event, but do document these within the typological notation.

regards to all the four gestalt principles outlined in the electroacoustic toolbox (proximity, similarity, continuity and closure). This unity was hard to ignore and was certainly heightened due to the abrupt changes between sound materials.

5.2.1.2 Classification – applying the typology framework

Once all the sound events were segmented within the work I then began to apply the typology grid outlined in Figure 5 (section 2.3.1). The process of classifying sound objects within the work was not as easy as I initially anticipated. It was easier to identify the type for short “micro-objects”¹⁶³; all of which fell within the balanced sound category, which Schaeffer (1966: 435) describes as sounds that have “a good compromise between the too structured and the too simple”. The sounds I am referring to are the short high-pitched pneumatic sounds that appear within piece at the beginning and throughout at 0’53”, 1’33”, 2’13”, 2’22” and finally at 2’44”¹⁶⁴. The majority of these sounds were categorised as belonging to the Y type, which Schaeffer (1966: 147 translated by Dack 2009) denotes as being a “continuously varying note”. There are two instances (which can be found at 0’02” and 0’53”) where an iterative complex note (X type) has been identified. These have been defined as complex rather than tonic because of the changes in spectrum (frequency) and timbre throughout the sound. Finally, the uses of

¹⁶³ As Schaeffer refers to them within the typology grid.

¹⁶⁴ Although the final sound is what Schaeffer considers a motif. This will be discussed in more detail later.

apostrophes were to indicate if the sound was a single impulse (one single apostrophe) or an iterative note (two apostrophes)¹⁶⁵.

At the end of the work there is an instance where multiple notes create what could be described as a pseudo-melody. In this instance, and because it is one sound recording, I noted it as type M (motif). Chion (2009: 154 translated by Dack) describes the M type as “possess[ing] an embryonic musical organisation”, which in this case does not fully emerge before the end of the work.

For the longer (and mostly iterative sounds) it was somewhat harder to classify them, mainly because they could be viewed as being more than one type by other listeners and even by myself upon different listenings. In these instances the dominant typology was chosen and the subtle intricacies were then documented in the morphology of the sound event (this will be discussed in the morphology section below).

All of the longer sounds fell into one of four categories: Zy (redundant¹⁶⁶ ostinato), P (ostinato), A (accumulation) and E (sample). The majority of the sounds are

¹⁶⁵ The majority of balanced sounds within the work were either a single impulse or iteration. The only instance where there was a continuous balanced sound (indicated with as just the type with no apostrophe) occurs at 1'33”.

¹⁶⁶ Redundant sounds are those that are commonplace and not original at all (Chion 2009: 143 translated by Dack). “[T]o arrive at redundant objects, we only need to start from balanced objects [...] and to extend their duration up to the point where every dynamic form disappears” (Schaeffer 1966: 448 translated by Dack 2009).

typed as P (ostinato) because of the clear use of closed grooves in the compositional process, something that Chion (2009: 151 translated by Dack) points out as being clear "artificial loops" of a sound event. When the rhythmical iterations were formed from a single unaltered mechanical sound itself and not from the forced loop the Zy type was applied¹⁶⁷. For sounds that had arrhythmic patterns of machinery sounds the A (accumulation) typology was used. Finally, the E (sample) was applied for the one instance (at 0'51") where there was a sound of unpredictable prolonged nature¹⁶⁸.

5.2.1.3 Description – applying the morphology framework

There were a number of ways I could have documented the identified and classified sound events morphology, one of which could have been to describe each sounds against the morphological criteria outlined by Schaeffer in the typomorphology recapitulation (Figure 6 in section 2.3.1). Instead I decided to use the typological notation Schaeffer developed (1966: 467) to identify a sound as being: composed, made up of several juxtaposed sounds; composite, made of several successive elements; a chain fusion, where composite elements are fused together; or, indeed, a combination of the three. The reason I chose to notate the

¹⁶⁷ Chion (2009: 151 translated by Dack) states that the Zy type can refer to "the interminable chirping of a bird, and the creaking of the water-wheel [...] belong to the domain of natural sounds and are the products of a single causality which is repeated cyclically" Therefore, it is a erratic repetitive sound that occurs in nature or machinery and, most importantly, is not the outcome of sound manipulations of any kind.

¹⁶⁸ The sound I am referring to happens to be, what I assume was meant to be silence, but because of the degradation of the recording there is now a subtle noise.

morphology in this way was firstly to have some unity with the methodology for the reader. If the reader understands the typology grid then they will also have an understanding of the notation as well. Furthermore, this typological notation enabled me to validate my choices for the dominant typologies within the classification section of the analytical process. Through using the typological notation I was able to indicate, through describing the sounds morphology, why I had deemed it to be of a certain nature.

Within the typological notation composed objects are notated (separated) with a full stop (X.N for example indicates a complex element sounding at the same time as a note); composite objects are defined with a plus symbol (X+X+X); and chain-fusions are marked by a forward slash (N'/N). To indicate a change in frequency between constituent sonic elements within a sound I added numbers¹⁶⁹. Finally repeated sections were bracketed with a times symbol and value to indicate the amount of internal repetitions within a sound.

5.2.2 Considering structures within *Étude aux chemins de fer*

After applying the typo-morphology framework only a few low-level structures were identified within the longer iterative sounds¹⁷⁰ and the motif (M) type at the end of

¹⁶⁹ This also allowed me to identify if a particular pitch within an iterative sound was revisited; something that was particularly useful with the prolonged Zy and P type sounds.

¹⁷⁰ These were identified as gestalt units within the work, mainly due to the abrupt cuts between sound events, but could easily be seen as event structures as discussed above.

the work. Since the framework does not describe how individual sound events function together I had to devise my own strategies. I chose to develop my own form of notation, rather than applying another analytical tool (such as Roy's *grille fonctionnelle*), that would allow me to describe the relation between the sound events. The reason for this choice was to ensure that any structural relationships were deduced from the application of the typo-morphology and not another analytical tool. Furthermore, the event-to-event relationships within *Étude aux chemins de fer* would not have been complex enough to condone applying such a complex analytical tool. Arguably the technology hampered any meaningful relationships that Schaeffer might have intended, but it is not under discussion here. What is paramount within this analysis is the focus on what is perceivable, not what might have been the composer's intention.

5.2.2.1 Event relationships

One aspect that could not be explained through the application of typo-morphology was the direct event relationships between identified sound events. To remedy this I defined a set of four simple symbolic references to describe how the sound objects interrelated. Please consult the table below for their terminology:





Symbol	Description
	A cross-fade between sound objects (usually achieved through silence) where neither is stronger than the other.
	The proceeding sound object cuts the previous one abruptly. Defined by a large change in dynamics and spectrum.
	The previous sound object finished abruptly to a weaker one. Defined by a large change in dynamics and spectrum.
	The proceeding sound object cuts the previous sound object abruptly, but they both share a similar intensity.

Table 3. Symbols used to describe event relationships within *Étude aux chemins de fer*.

These four archetypal event relationships are all based on the intensity of the two connecting sounds. No other relationships are considered to avoid overshadowing what might be understood from investigating the outcome of the typomorphological analysis.

5.2.2.2 Structural relationships

Looking beyond the event-to-event relationships a few interesting structural relationships can be deduced from the applied typology. There appear to be, from my application of the typology within the classification part of the analysis, two main structural relationships that run throughout the work: small pitched pneumatic sound sections, containing the balanced sounds within the work; and longer variations of the iterative mechanical sounds. As previously discussed in section 5.2.1.2 the balanced sounds occur six times throughout the work; becoming more

frequent towards the end. They act as contrasting materials to the mechanical repetitive nature of the locomotion sounds. Their sharp juxtaposition completely shifts my focus when they appear within the piece.

The longer collection of repetitive mechanical sounds act as variations within the work. These are formed by a collection of typologies, from the redundant (Zy) and excentric (P, A and E) sound types¹⁷¹. The first section contains the biggest collection of these typologies, covering three of the four aforementioned types. As the piece progresses the variations between different sound types diminishes, firstly removing the redundant sound and then finally becoming more focused on the P (ostinato) type. We can hear that the use of closed grooves was gradually increased throughout the work, focusing more on forced looping rather than the mechanical iterative sounds of the locomotion. Before the final motif at the end there is a long redundant sound (Zy) at 2'28'', the first (and final) to be present since the penultimate redundant sound at 1'11''. This final redundant sound lasts 16 seconds, the second longest sound in the work and the longest redundant one. It is also the longest sound that is not manipulated, as the longest sound within the work is a type P (ostinato); a sound created by the closed groove technique¹⁷².

¹⁷¹ Within appendix 3 redundant sounds have been assigned the colour green, whilst excentric sounds have been given the colour blue. This colourisation becomes much more useful when looking at the overall structure of the work, which will be discussed in due course in section 5.2.2.3.

¹⁷² The sound emerges at 0'21'', lasting 24 seconds in total.

The connections between these two structural relationships are that as the pneumatic sounds become more prevalent within the work so too do the closed groove sounds. It is only towards the end where a drastic change occurs in which a Zy type sounds on its own, allowing for variations in intensity and rhythm; followed by the inclusion of the motif, which is a stark contrast to the other pitched pneumatic sound sections within the work. From these findings I defined three larger structural relationships: two variations (one where there still exists a selection of differing sound types (variation 1) and another in which the majority of sounds are created with closed grooves) and a coda (where the biggest variation in musical materials occurs). What is interesting is that there are some clear structural considerations, perhaps not from an event-to-event perspective, but certainly when looking at the grander architecture of the work.

5.2.2.3 Overall form

When viewing the overall form as described above the compositional structure becomes apparent (see Figure 17). The three architectural higher levels are clearly defined with the colour indications of the internal sections. All of the variations are cut with pneumatic sound sections (balanced sounds) highlighted with the colour purple.

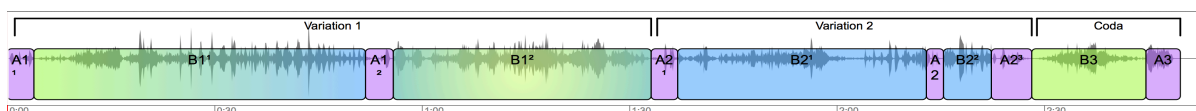


Figure 17. Overview of the structure within *Étude aux chemins de fer*.

As stated previously these structural relationships were not defined through event-to-event relationships, rather they were determined by looking at global changes in the sound types used as the piece progressed. These larger transitions bear little relevance to the micro event structures within the work, but there certainly is, from my interpretation, a clear perceptual change in sound types throughout that creates this overarching structure.

5.2.3 Composition history and composer's intentions

I might suggest that the work itself was meant to be a study into whether or not listeners could adopt a reduced listening approach to sounds that were recognisable. It was the first of a series of five studies called the *Cinq Études De Bruits*, all of which focused on different sound sources ranging from instruments to casserole dishes. Gayou (2007: 73) documents the first radio broadcast of *musique concrète* that was aired in 1948 on Paris-Inter. All five of the studies were played as listed below:

- "- Étude n1 *Déconcertante*, ou Étude aux tourniquets (3'00");
- Étude n2 *Imposée*, ou Étude aux chemins de fer (3'25");
- Étude n3 *Concertante*, ou Étude pour orchestre (6'00");
- Étude n4 *Composée*, ou Étude au piano (3'30");
- Étude n5 *Pathétique*, ou Étude aux casseroles (4'10")."

It is interesting that the length of the original version of *Étude aux chemins de fer* is listed as 3'25", whereas the released version (which appears on a number of different CD compilations) is shorter at 2'54". A change of 30 seconds might not sound a lot, but for a work of less than 3 minutes it makes a huge difference. What is also of interest is the French word *imposée*, used to give further differentiation between the five studies. One might not be able to put too much emphasis on the choice of words as Schaeffer was known to have a self deprecating sense of humour, particularly in relation to his music and research highlighted by the choice to use *pathétique* as a description for *Étude aux casseroles* (1948).

The studies were the first compositions of Schaeffer to test his concepts of reduced listening and *l'objet sonore*. It is through applying typo-morphology that I have tried to treat all the sound events as sound objects; concentrating on the perceived materials qualities and not the referential aspects that might be inferred.

It is a sound unit perceived in its material, its particular texture, its own qualities and perceptual dimensions. On the other hand, it is a perception of a totality which remains identical through different hearings; an organised unit which can be compared to a "gestalt" in the psychology of form. (Chion 2009: 32 translated by Dack)

The closed groove compositional strategy was an attempt by Schaeffer to force listeners to hear the sound events as sound objects. Both this and the cut bell are what Schaeffer refers to "exercises in interruption" (Schaeffer 1966: 391 translated by Dack 2009) – a means of forcing a reduced listening approach from the listener.

Étude aux chemins de fer is a composition entirely based on the concept of closed grooves and repetition to force a listener to hear the sounds as sound objects. It should be stated that I heard the sounds as sound objects because I chose to, not because of the composition of the work. If I were to allow myself to hear the sounds naturally I would immediately recognise the sound source. Interestingly enough I found it harder to listen to the whistle sounds¹⁷³ as sound objects. Perhaps if Schaeffer had looked into ways of removing the recognisability of the sound's source, as he did with cutting the attack of the beginning of a bell sound¹⁷⁴, the referential aspects of it might have been lost¹⁷⁵. As for the locomotive sounds¹⁷⁶ the transition to a reduced listening approach was much easier, although it would have been so much more effective if the repeated sounds did not vary in volume and dynamics. This, however, would have certainly made the work less aesthetically pleasing and even more of a scientific study, which would arguably be redundant because the reduced listening approach would be induced through a scientific intent and not a compositional one.

Whilst listening to the work I did not perceive any compositional methodology within

¹⁷³ What I have referred to as high frequency pneumatic sounds within this analysis, in keeping within the reduced listening strategy.

¹⁷⁴ Removing the attack of a bell sound had the affect of making it sound like a flute (Schaeffer 1966: 417). However, it is questionable if this same technique would have had the same effect on the whistle sound.

¹⁷⁵ Obviously the technology could not permit such compositional acts and the sounds themselves were not stable pitched/nodal sounds like the struck bell Schaffer referred to.

¹⁷⁶ Which have been referred to as repetitive mechanical, or machinery sounds within this analysis. Again to demonstrate the reduced listening approach adopted by myself as the analyst to apply the typo-morphology tool.

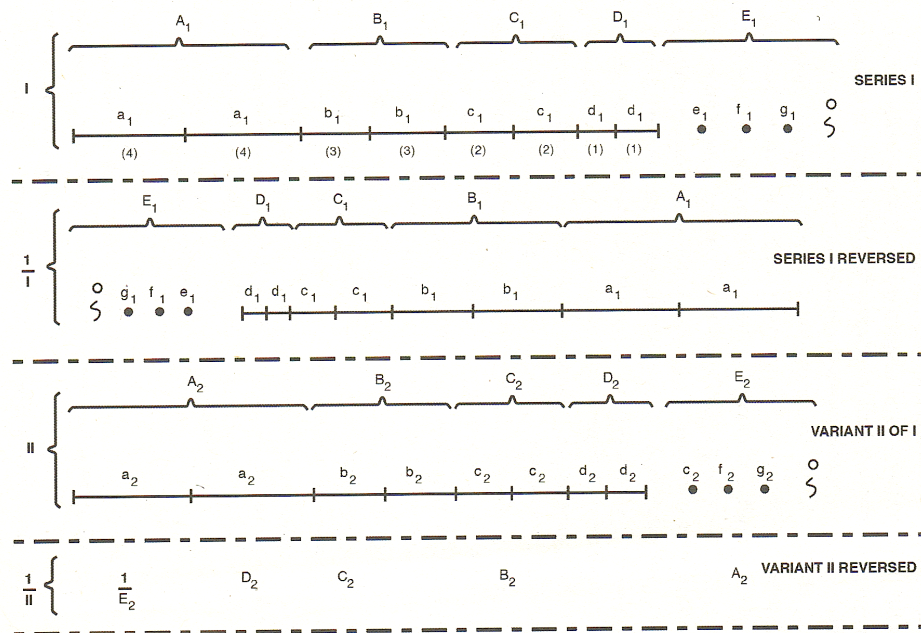
the organisation of the sounds, only by the choices of sound types in the grander structural arrangement. I was certainly torn, at first, as to whether I should put such a work under such scrutiny, but I changed my opinion upon discovering Schaeffer's intended structural relationships (this, for an analyst interested in understanding a work, is a remit to test the validity of the composer's claims). To my surprise I found out later within some of Schaeffer's literature that there were in fact serialist compositional structures being used within the work. Upon further investigation I decided to see if I could hear these serialist sequences he referred to. Figure 18 shows the diagram, taken from *In Search of a Concrete Music* (2012), for a sequence (not the entire piece) within *Étude aux chemins de fer* that documents many different variations within the chosen section.

I was somewhat frustrated that there was, firstly, no indication of which part of the work it references. Using my own structuring of the work I tried to discover these supposed structures, but to little avail. The notated repetition and reversal of sounds and their relation to the work eluded me. Schaeffer (2012: 25), however, was aware of this and stated:

However constructed these sequences may appear, a listener, in the act of hearing, will sense a vague organisation but will be nowhere near to perceiving its rigour. The pursuit of such Cartesian rigour in construction, as well as coming up against insoluble instrumental problems, is no guarantee of aesthetic effect.

Before knowing the intended compositional sequences of the work I was content

with my interpretation and understanding. Once I knew of the intentions my initial satisfaction dwindled. I began to question my methodology and understanding of the work. Perhaps these structures would not have been so elusive if I had applied an analytical tool devised for structural relationships rather than relying on typomorphology to deduce the potential structural intentions. What is clear is that one cannot apply a tool specifically meant for sound events to understand the potential complex compositional strategies of a composer. I chose to limit myself to using only typomorphology to understand if it could aid in defining structural relationships. Although it did not uncover the exact structural relationships as defined by Schaeffer it did uncover a potential overarching structure relating more to the form of the work than the event-to-event relationships.



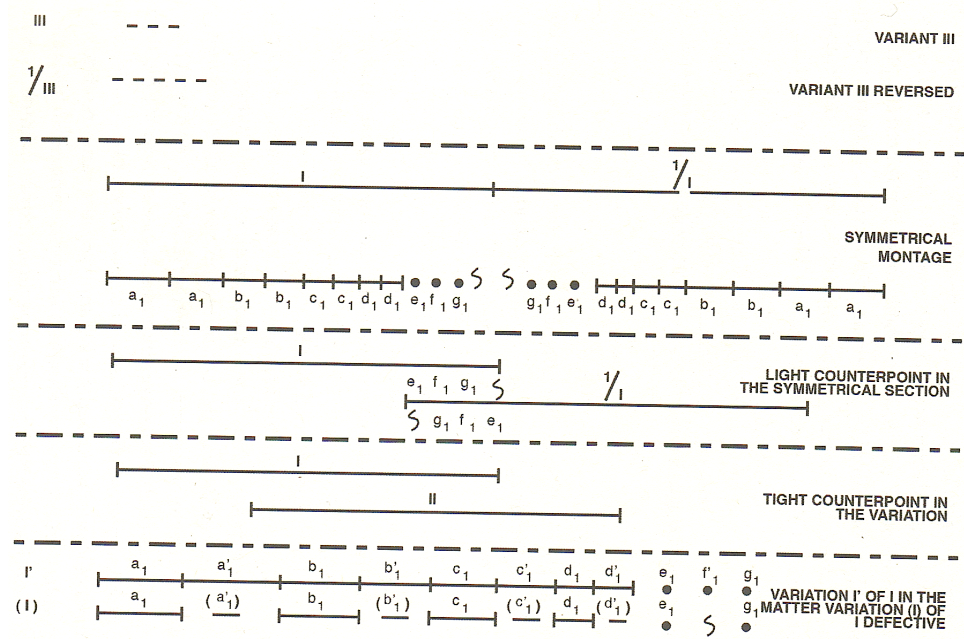


Figure 18. Serial structures of *Étude aux chemins de fer* (Schaeffer 2012: 27-28).

5.2.4 A word on aesthetics

A reduced listening approach is needed to apply Schaeffer's typo-morphology. In doing so all of the source-cause aspects, in relation to the aesthetic experience of the work are put aside. Instead audio perception becomes the only aspect that is of interest, particularly the internal details of a single sound. "In reduced listening, our listening intention targets the event which the sound object is in itself (and not to which it refers) and the values which it carries in itself (and not the ones it suggests)" (Chion 2009: 31 translated by Dack). Knowing this and, that this work is a study first and foremost, removes any emotional impact it might have had. However, this is not the only reason for the lack of emotional involvement from me as a listener. Placed in a different context these sounds might have been

evocative. My deduction is that it is the structuring of the work that renders it, for me, emotionless. Its rigidity and lack of overlapping elements makes it sound lifeless and in doing so it removes the humanistic elements to a sound that evoke a visceral emotional response (be it gestures or utterances)¹⁷⁷. What we are left with are textures that, if they have no immediate significance to the listener, remain hollow. It feels clinical and there is a clear sense that its purpose is not for the enjoyment of the listener, but for the appreciation of a researcher.

5.2.5 Closing statements

I don't believe that this is the absolute application of Pierre Schaeffer's typomorphology for this composition; rather it is my interpretation of both the work and the application of typomorphology. It is clear that Schaeffer had compositional intentions, however vague they might be, which do not reflect my findings in the application of his typomorphology. Furthermore, other listeners, using the same methodology and analytical tool, might not segment the work as I have or define the individual sound events with the chosen typology. Interestingly I cannot, now that the analysis is finished, hear the piece any other way than the understanding outlined within this subchapter. I cannot separate my interpretation with my application of the typomorphological tool from the work; they are now inextricably

¹⁷⁷ Arguably the whistle sounds might have an emotional impact on the listener because of their form and pitch element, but for me they remain devoid of human agency. Again this might be because of the structuring of the work.

linked. For me the piece will always be an experiment rather than a study, one that is unsuccessful in its initial intentions.

5.3 Analysis of *Toupie dans le ciel* by François Bayle

There are a number of reasons personal to me for why I have chosen this piece in particular. *Toupie dans le ciel* is one of my particularly favourite pieces of what can be described as an acousmatic composition, by one of my favourite composers, François Bayle. This would, of course, be something of a tenuous reason for analysing a work, particularly as my reception of it is clearly positive from the start. However, there is a deeper reason for this choice that is related to a particular performance of this work, which I witnessed at the 2008 *PRÉSENCES électronique* concert held at the *Salle Olivier-Messiaen* in Radio France, Paris. Unlike other concerts I have witnessed of acousmatic works this one had a wider demographics represented within the hall. The concert series itself encourages this as it places classic acousmatic works next to emerging electronic artists, who arguably have more relevance to popular electronic music and thus a wider appeal. What interested me most was the reaction of the audience as the piece played. Many seemed entranced by the work, particularly the younger members of the audience. I was immediately interested in why this piece in particular transcended the divide between more popular musical works and those considered less accessible. I cannot now gain further information from the younger members of the audience who received the piece (beyond my experience and memory of the performance),

but I do want to investigate the potential reasons for why this work was so well received. To do this I will undertake a phenomenological analysis, following the methodology of Lawrence Ferrara in his article *Phenomenology as a Tool for Musical Analysis* (1984).

Although this is a piece I know well I have not investigated any poietic information surrounding it prior to this phenomenological analysis. I will, at the end of the analysis, look into any information pertaining to the creation and meaning behind the work and reflect on my own experience and interpretations.

I will be analysing the 2009 version of the work¹⁷⁸, which can be found on the recently published compilation CD *50 Ans D'Acousmatique* (2012). All five movements of the work will be combined into one consecutive piece within the investigation process.

5.3.1 First open listenings

The open listenings outlined below were undertaken in a studio environment using a stereo pair of speakers. I listened to the work in its entirety for each reflection,

¹⁷⁸ As I am unsure of the version used within the performance I will use the republished version of the work.

noting my subjective responses on paper whilst I listened¹⁷⁹. There was a thirty minute gap between listenings to rest my ears, but at the same time to have the work fresh in my mind.

As Ferrara describes, all aspects of a work can be investigated within the open listenings including: the syntax, semantics and ontology of a work; therefore, my responses discuss and often jump between aspects of sound typology, morphology and the potential meaning behind the sounds and the overall piece. The notes I have taken have been rewritten as much of my notes were made in shorthand to avoid losing concentration and to remain in the listening flux.

Since these are open listenings only some significant sounds (with accompanying timings) will be given. A more detailed account of the interpreted structure will be outlined in the syntax listening section (5.3.2).

5.3.1.1 Reflection 1 – First open listening

The majority of sounds present appear to me to be electronic in nature and have a clear sense of pitch. Only a few sounds emerge throughout the piece that resemble real-world sounds; although these sounds could also have been produced with

¹⁷⁹ These initial open listenings were the first time I had listened to the piece in a number of months. Therefore, my memory of the work and sections was not perfect at the time, meaning I did not have any real preconceived notion of overall form or anticipation for what might happen next within the musical flux of the work.

electronic means. The pitched electronic material is quick and within close proximity to the other pitched materials, making it hard to decipher them as individual sonic entities and thus I hear them as gestalt units.

The piece is clearly bookended by what I described (within my listening notes) as a hectic beginning where the material gives a sense of being thrust (in fact elevated due to the glissandos) into another world, somewhat devoid of clear form. However, I was surprised by the arrival of, what will be termed, the ‘main motif’ of the work at 2’04”. Unlike the beginning and subsequent end the main motif provides a serene and calm environment. There are two main sound types, a bass sound fluctuating between two pitches¹⁸⁰, and higher frequency motifs that, like the beginning, are so closely aligned I find it hard to really depict their variations and thus hear them as gestalt units. The bass sound provides a rhythmical anchor to this part of the work, which provides the main theme for the entire piece. It resembles a rhythmical motion similar to breathing, which for me provides a relaxing foundation that subconsciously draws me into a deep and tranquil listening mode. It is almost trance inducing; I can feel at times I am getting lost in the piece. Conversely, the higher frequencies seem at opposing ends to the calming nature of the bass interval giving a sense that the work is always on the brink of breaking down. These higher frequencies insinuate a potential for sudden change in musical

¹⁸⁰ This interval is dependant on the transposition of the material at a given time as this changes at various points throughout the work

material from the peaceful environment they provide, which is satisfied by the major departures from the main motif.

The major departures occur through prolonged sections of the work, which are very apparent upon this first listening. My focus is clearly reactive as I try to immerse myself into the work. When a change transpires in the piece I find myself being jolted away from this serene environment that I was becoming accustomed to. These departures force a new listening perspective and in doing so feel rather abrupt and uncomfortable; I have to re-immersify myself into the piece. There are two main departures from the main motif to recount: one particular jarring deviation from the main motif where a 'plane-like' sound engulfs the musical environment at 12'23", overshadowing the other elements of the work; and similar pitched material to the beginning and end where the hectic material returns at 20'27". The 'plane-like' sound appears twice within the piece (the second appearance occurs at 19'44"), whereas the hectic pitched material only occurs once just before the end. When this new musical material is introduced the focus of the listening completely changes. Now I am trying to identify what the sound is (hence my 'plane-like' description of the sonic material), rather than how it relates to the overall learnt structure thus far¹⁸¹. These deviations provide a sense of confusion, more than

¹⁸¹ Within the first reflection I was still reacting to the new material when it arose within the piece, hence many of my initial comments relate to describing the sound sources rather than their function within the work.

anything else, as they thrust my listening experience away from the serene environment I was getting accustomed to. The material is completely different in the deviations from the main motif; it demands the listener to change focus, drawing them into a false sense of peace before changing the game completely.

After these deviations I find myself listening to the main motif differently. I start to notice the dynamic shifts in volume of the material, making some elements come to the forefront of the composition, dominating my listening attention. This is particularly prevalent with the higher frequencies within the work. I notice that I start to understand what were initially gestalt units as individual sonic entities that form event relationships. I still hear them as gestalt units, but understand that they are, in fact, sonic entities that form event relationships. However, in the listening flux I am unable to differentiate between them individually with all the other sounds occurring at the same time. The changes to the main motif feel less abrupt and are akin to small variations rather than major changes in the overall composition.

The bookend (which will now be defined as the overture & coda of the work) described previously frames the overall form of the work. This not only has the effect of making me feel as if I am elevating (or plunging into a new world), but also that I am returning to the 'real world' from whence I came. Structural relationships within the work are overshadowed by either the tranquil nature of the main motif, which admittedly loses its control after the initial 'plane-like' deviation, or the

interruptions that occur to break the perceived flow of the work. There are clearly structural relationships within the work, but these are not the focus on this initial listening. My focus mainly shifted from a tranquil listening state (where I was being drawn into the breathing-like bass interval and the main motif) to trying to recognise the source-causes of the deviations (the interruptions to the main motif) that followed.

5.3.1.2 Reflection 2 – Second open listening

The sense of falling re-emerges at the start, akin to Alice in Wonderland when she goes down the rabbit hole. The shifts in sonic material, now appearing to be less random, make way for the main motif of the work. Also, as I know it is the overture of the work, the beginning feels less random and more of a compositional necessity considering the piece's structure as a whole. The transitions between sonic materials seem smoother as my understanding and memory of the piece expands from that of the first listening.

The main motif is still entrancing, drawing me into a sense of wonderment. The bass breathing is still very much present, but the higher frequencies have less impact as I let them wash over me. Deviations from this main theme also do not feel so abrupt as they once did; rather they feel necessary to prevent the listener from receding into a passive listening state.

The majority of the sonic material seems to flow better on this listening. The immersion feels much greater this time around, but so is my focus. I am no longer trying to catch up with the material when it changes, rather I allow for my listening mode to shift abruptly, which has the effect of focusing my attention on particular material, specifically the small variations to the main motif. These small variations are now the focus of my listening. I am no longer listening passively to rest my ears as I did in the first reflection, but am actively searching for these variations, attempting to perceive the event and structural relationships. I now see that there are three levels of sonic material in the main motif: the breathing bass, the higher frequencies and the middle frequencies that emerge less often (initially I grouped both the higher and middle frequencies together because of their close proximity and similarity).

The 'plane-like' deviation still feels a little intrusive compared to the rest of the composition as it drowns out any other sound. This departure is once again short lived and fleeting, making me question its compositional role. Structurally it is still too jarring when compared to the other materials. However, the introduction of the 'plane-like' material towards the end provides a convincing departure from the sound material, unlike its initial appearance in the middle. The vast changes that lead up to the slow fade-out of the main motif, which then leads to the coda, is completely relaxing. This is notable for two of reasons; the main one being that other sonic material remains in the background of the deviation, providing a bridge

between the sections. The other reason is that it ends with another deviation, similar to the hectic beginning.

5.3.1.3 Reflection 3 – Third open listening

The beginning no longer perturbs me. There is no sense of falling (or rising) anymore; rather it feels more like a journey. My focus is on the known transitions (the deviations from the main motif which originally confused me) and the higher frequency material that gives them their impact through sonic contrast. Once again I find myself focusing on small gestalt sections of the work; I am yet to separate the material mentally whilst in the listening flux. This seems to be part of the compositional intent that one cannot separate these materials without using other means in order to hear the sounds more clearly¹⁸². They appear and disappear too fast for me, perhaps not for someone else. The tranquil environment within the piece only heightens my frustration as I try to prise myself away from it in order to listen to the work activity, rather than allowing it to engulf me.

The ease of transition between the beginning and the main motif is very apparent in this reflection, more so than the second. The transformation feels natural, necessary. I notice all three levels of the main motif now: their functions and

¹⁸² This might include slowing the work down and repeating sections of work, or using software such as AudioSculpt to highlight certain sonic features. Potentially highlighting elements that would otherwise not be perceivable within the listening flux. For a piece such as *Toupie dans le ciel* one might be tempted to use such techniques, however these were not utilised within this phenomenological analysis.

movements and their interactions to create musical discourse, but not their individuality. Not only this but the subtle variations are more prevalent; the slight changes in dynamics more fluid. The main motif is dragging me in even more than before. I feel a sense of total relaxation; a complete abandonment of my thoughts outside the listening. It is a strange dichotomy to be listening intently and at the same time allowing the music to pass over me. Little elements that were not immediately apparent are now heard. The bass sound resembles waves more now than breathing, as the other sounds immerse me. The rhythms of all the material are at odds, forcing me away from finding a clear footing; it is mesmerising.

The transition to the 'plane-like' section now feels 'right'. There are no sharp changes, but a progression, albeit tight, that I did not notice until now. When the main motif re-emerges it feels fresh to my ears. The suspension is welcome to clear my perspective and maintain concentration. There is a real sense of drama, especially when the 'plane-like' sound makes an appearance again towards the end.

The material at the end of the work now has a clear function within the overall form. It is a big diversion from the material in the main motif, but as I said previously it acts as an overture & coda to the work. This, more so than the other times, feels as though there is a real sense of a journey, one where I am thrust into a new world (a sound world if you will) and then transported back to the real world. This feeling

was present in the previous listenings, but is most prevalent in this one. I am no longer reacting to the piece as I did in the previous reflections; rather I am now anticipating changes, seeing the larger form of the work.

5.3.2 Syntax listening

Following Ferrara's methodology I moved from open listenings to syntax listening. As stated in the previous section the lower level events within *Toupie dans le ciel* presented a problem within the open listenings. The overall form of the piece was much more accessible than the smaller gestalt elements, which, up until this particular orientation towards the work, remained inaccessible perceptually in the temporal flux. In order to get a greater understanding of the lower-level events in the work I allowed myself to repeat sections in each reflection in this syntax listening strategy so that I might familiarise myself with each level outside the temporal flux of the work¹⁸³. It was only in later reflections that I began to understand the sound event level of the work. A top-down approach to the analysis was taken whereby I segmented the overall structure before I considered the meaningful units and the subsequent sound events within the work¹⁸⁴. Since this was my methodology for segmenting the work it seems fitting to apply the same structure to these reflections as well.

¹⁸³ Repeated listenings were only exercised within the syntax listening reflections.

¹⁸⁴ This also reflects my listening structure from the initial open listenings.

Ferrara does not provide a particular framework to discuss the syntax of the work. Therefore, I will be employing a general sectional analysis of the work before going into more depth. The electroacoustic toolbox framework terminology will be used as identifiers to further describe the segmentation of the work and to indicate the compositional workings of the individual sections.

5.3.2.1 Reflection 4 – Form

Upon closer inspection, and following on from my initial comments within the open listenings, the form of the work is split into four main sections: the main motif (occurring at 2'04", 8'05", 13'21", 15'46", 16'42" and 20'37"), the overture & coda (the framed beginning and end to the work at 21'12"), interruptions (major changes to the main motif which appear at 7'22", 15'30", 16'34" and 20'27") and finally deviations (the low 'plane-like' sound which materialises at 12'23" and 19'44"). Each of these sections has a separate compositional function within the work, hinted at in the names applied to them. The terms *overture & coda* and *main motif* have already been discussed in the open listenings; however, there might be some confusion between *interruptions* and *deviations*. *Interruptions* refer to sharp changes to the work, which always cut the main motif section and are subsequently followed by another motif section. *Deviations* do not necessarily cut the main motif of the work (in fact they always play in conjunction with the main motif) and are separated due to their vast difference in sonic content, both in texture and timbre compared to the other sections of the work.

Figure 19 is a representation of the overall form of the work. Within the main diagram: green represents the overture and subsequent coda (A sections), blue denotes the main motif (B sections), red signifies the interruptions (C sections) and orange constitutes deviations (D sections). There is some overlap between sections that is noticeable and will be expanded upon within the meaningful units section.

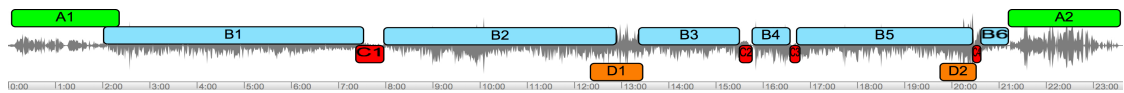


Figure 19. Overview of the sections within *Toupie dans le ciel*.

The overall form of the work is quite clear from this overview. Forgetting the overture & coda, for the moment, the majority of the work is based on the main motif and the interruptions. There is only one instance where an interruption does not break the flow of the main motif and that is at the first deviation within the work (D1). Although this deviation does have a similar function within the work as the interruptions it does not cut the main motif and allows for smoother transitions between the sections and an overlap of the material. As the name suggests the interruptions completely cut the main motif. There is only one exception to this, the first interruption (C1), which does abruptly enter the work whilst allowing for the main motif to fade out.

The longevity of the main motif does change vastly throughout the work. For example, the beginning motif lasts for around 5 minutes and 30 seconds, whereas the second biggest section (B2) last for around 5 minutes. These differences in time can be seen to shrink throughout the work as the interruptions occur more frequently. The only exception to this rule is section B5 of the main motif, which is the third longest motif section within the work. This particular section does end with what can be considered the climax of the work, where both a deviation occurs before an abrupt interruption (C4) intervenes, sharing little resemblance to the other interruptions within the work.

5.3.2.2 Reflection 5 – Meaningful units

The overview does give a sense of how the larger sections work as part of a whole. However, there are many variations within the sections (particularly within the overture, coda and main motifs) that, although minor in the larger view of the work, do effect the listening of that particular section. What is interesting is that the sections that contain the main internal changes and variations are the overture & coda. Both of these have activity both in the horizontal and vertical plains and are, arguably, the most complex sections with regard to the their individual composition.

The internal changes, similarly to the larger sections of the work, only have three main archetypes of interaction: interruptions, signalling a sudden entry of a new section; abrupt stops, often the result of an interruption, although this is not always

the case; and fade in/out, often allowing for sections to overlap rather than cut another off completely.

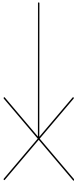



Function	Symbol
Interruption (beginning)	
Abrupt stop (end)	
Fade in/out	
Relation	

Table 4. Relationships symbols used within the analysis of *Toupie dans le ciel*.

Figure 20 provides an overview of the meaningful units within the first section (A1) of the piece. Following on from my previous comment it is clear that there is a lot of internal activity within this first section of the piece. The sonogram gives some indication of the different sound events present and their relationship to one another, but for further clarification of the changes the above schema (Table 4) has been applied to demonstrate this.

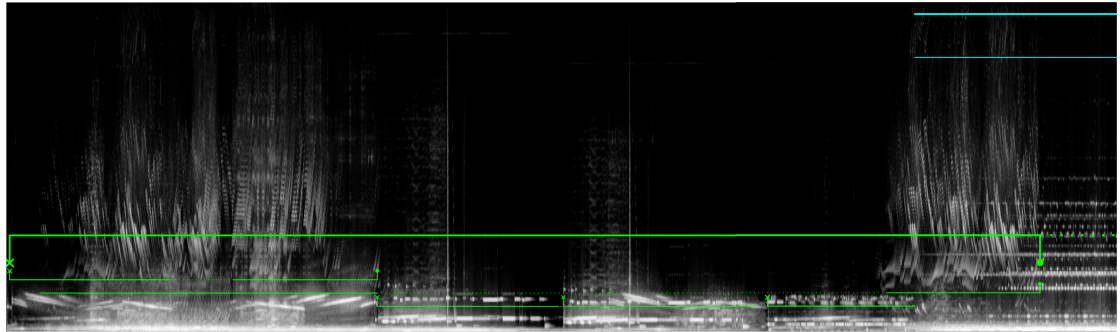


Figure 20. Overview of meaningful units within section A1 of *Toupie dans le ciel*.

One of the interesting aspects of the work, which I did not notice until focusing on the meaningful units within the piece, is that there are many relations between event and structural relationships. The most obvious, from the overview of the piece, is the overture & coda that frame the work. However, internally within sections there exist relations between recurring materials, which show that this compositional choice exists beyond the simple concept of enclosing the work with a similar beginning and end. A broken line, showing when internal sections resurface, indicates these relationships. Focusing on the first internal section one could comment that it itself is an overture & coda. The second internal section that arises just after, although the relation only re-emerges at the end of the section, also echoes this. Other relations are based closer together and are signalled by fade-outs and interruptions.

Conversely, the internal changes within other sections are less frequent, specifically within the main motif of the work. Internal changes within the main motif

do not arrive often, but do present major changes within the context of the section in question. Because the main motif changes very little, any abrupt changes (which are normally signalled by a transposition of some description) become very evident to the ear¹⁸⁵ within the flux of the work. Furthermore, the internal changes are also framed similarly to the overture & coda of the work, echoing my comment of the internal relations within section A1.

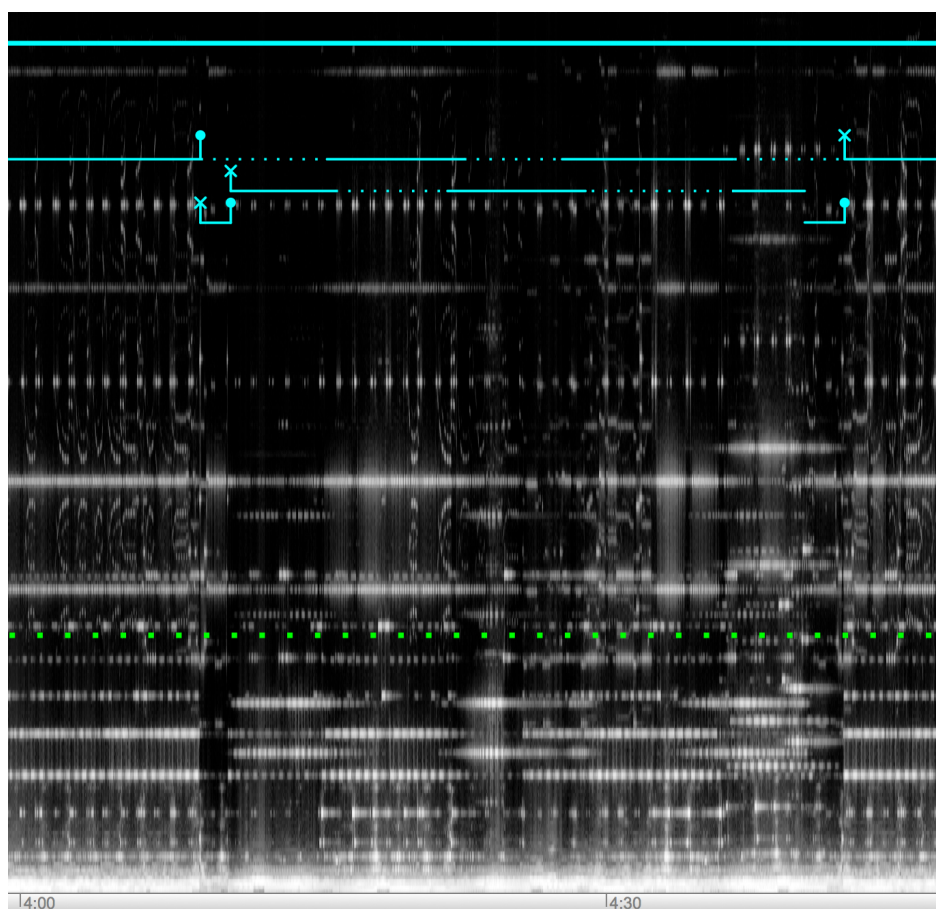


Figure 21. Example of minor changes within section B1 of *Toupie dans le ciel*.

¹⁸⁵ Something that I mentioned in the open listenings of the work.

As the piece progresses the internal changes become less complex. I have decided not to note changes within sections C or D as the changes are too subtle to notice, or do not have such a strong effect as other sections due to their duration.

Nonetheless, the internal variations within the main motif become less complicated as the piece progresses and the length of the main motif gets shorter¹⁸⁶. One prevalent example of this is the ending of the work.

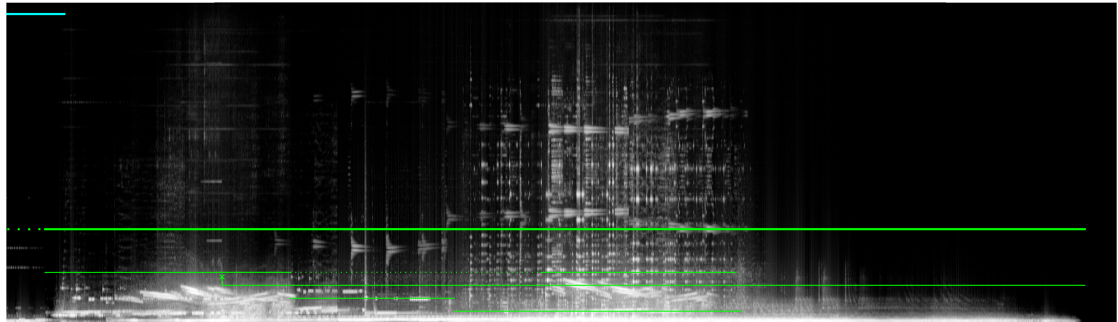


Figure 22. Overview of meaningful units within section A2 of *Toupie dans le ciel*.

Comparing the internal variations of the ending to that of the beginning highlights the gradual devolution of complexity, both in terms of layering and how the variations emerge within the section. In section A1 the majority of sound material interrupts the previous unit, whereas in section A2 the majority of units are faded in and out within the mix of the work.

¹⁸⁶ This can be seen in the full analysis of the work in appendix 4.

5.3.2.3 Reflection 6 – Sound events

There are a number of different sounds presented within *Toupie dans le ciel*. Too many to recount in depth as the individual sections discussed above are made up of a multitude of different sound events, many of which are slight variations of a previous one. It seems preferable to split the sound events by section, as some are only present in one section throughout the piece, which give that particular section its identity.

5.3.2.3.1 Sound events in A sections (overture & coda)

The greatest variation of sound material is within the overture & coda of the work (sections A1 and A2). Within this section all the types of sound events that exist within the composition are present¹⁸⁷. However, there are also sounds only present within these sections, which give both sections their identity, separating them from the others. The main sound events presented within these sections are: glissandos, a low rumbling (similar to that of the variation sections D1 and D2), sharp attacks (acting as points for variations within the sections, whilst sharing a strong resemblance to the C sections), and a melody line of intervals (which is akin to the main motif sections). Beyond that there are variations between both sections A1 and A2 in their sound events, reflected in the meaningful unit level structures. In section A1 there are higher glissandos that accompany the lower ones that can be

¹⁸⁷ Although they are not entirely similar in their melody and pitch, their typology remains the same.

found in both sections, whereas section A2 has a unique shimmering sound that is not found elsewhere within the composition.

5.3.2.3.2 Sound events in B sections (main motif)

The majority of sonic material presented within the B sections of *Toupie dans le ciel* is pitched. As the individual sound events were in close proximity to one another it was hard for me to hear them individually, hence I heard them as gestalt units within the open listenings. When focusing on the individual sounds, I found that many of them that I considered to be individual were actually transpositions of the same material. It just so happens that the ‘wave-like’ bass sound I referred to could have been transposed, creating a quicker and higher pitched interval¹⁸⁸. This presents an interesting quandary for the analyst, whether to represent these sounds as individual sound events, because of their differences in pitch (which could be quite large intervals), forming an event relationship, or whether the listener decides (like I did) that due to the close proximity, similarity and continuity that these sounds are in fact a gestalt unit. These transitions occur on all three levels of the main melody discussed within section 5.3.2. The difference being that the interval jumps are more perceptible within the lower frequencies.

¹⁸⁸ This is merely conjecture at this point, as I did not use any software to highlight certain aspects of the work, or manipulate it in any way.

5.3.2.3.3 Sound events in C sections (interruptions)

The sound material within the interruptions is extremely similar in timbre and composition to that melody line present within the A sections. As described in the meaningful units section this material is always introduced into the piece by cutting off the main motif (B sections). However, the sound events themselves are not, for the main part, what one might expect for a sound choice that abruptly cuts off previous material. They are often subtle and quiet and the sound material present in these sections is only slightly divergent to that found in the B sections.

Section C4 presents a slight departure in the melody compared to the other three sections. The sound events timbre is very similar, but the melody and pitch make it sound like a completely different section entirely. As stated previously in the open listenings this section is heard within the overture & coda of the work.

5.3.2.3.4 Sound events in D sections (variations)

The ‘plane-like’ sound I heard in the open listenings is the biggest deviation in typology and morphology compared to the other sections. It is one of the only sounds that is not built from intervals, rather it is a drone that lasts the entirety of the meaningful unit it is placed within. The sound itself gives a sense of constantly falling, like a shepherd tone, giving it its unique identity within the work.

5.3.2.4 Overall syntax comments

What I found throughout the work, both at the level of overall form and individual sound events is that they are both based on two particular concepts, that of abrupt change from two or three states of rest and transpositions. This is echoed in the transpositions within the pitched material and the abrupt interruptions both at the structural relationship and the event relationship level. As the internal changes within individual sections become less complex the changes in the overview composition of the work become more rapid.

It occurred to me, after trying for a number of times, that perhaps this work does not intend for the listener to hear the intricate sound events within the higher structures. As Smalley (1997: 114) states there are types of sounds and structural continuities that direct one to listen continuously in a global, high-level mode. This is certainly something that I experienced, particularly in the open listenings when I did not allow myself the option to repeat sections of the work.

As mentioned there are some anomalies that go against the function of that particular section within the work. The most notable are: C1, as it does not completely cut off the main motif¹⁸⁹; D1, the only example of a deviation functioning compositionally like an interruption; B5, simply because it does not follow the

¹⁸⁹ This might have been a compositional choice of Bayle to ease the listener into the work before completely submerging them into it.

reduced main motif theory presented within the form section (5.3.4.1); and C4, as the musical material does not bear much resemblance to the other interruption sections.

5.3.3 Semantic listening

Rather than taking the figurative approach as Ferrara does in his analysis (1984: 368) I have decided that to look at changes in interpretation based on the structural aspects within *Toupie dans le ciel*. The main reason for this choice was that the sonic material itself did not evoke any referential meaning, as many of the sounds within the piece were, to me, abstract in nature. I noted my responses in real-time whilst listening to the work in order to record my responses and to remain truthful to my interpretation. These responses were usually just one-word reactions to what I was hearing in one particular reflection, since anything more would have required more time and taken me out of the listening flux. There were two main reflections within the semantic listenings: my initial responses based on my notes and then an overview of the semantic responses to see if there was any connection with the material and my reactions.

5.3.3.1 Reflection 7 – Initial semantic responses

In the initial reflection I had many responses, many of which did not coalesce into

an overall theme¹⁹⁰. The table below lists the initial responses and their location within the syntactical form outlined in section 5.3.2.1 along with their approximate time. Since there is overlap between some sections in the syntactical form, the response will be listed in the predominant segment¹⁹¹.

These responses are my initial unfiltered thoughts that occurred during the listening process¹⁹². One will note that some sections shift quite suddenly between states of disapproval to acceptance and even enjoyment.

Location (form location)	Response with time
A1	0'00" Falling 0'15" Shifting 0'30" Disembodiment 0'44" Realisation 1'00" Shock 1'18" Acceptance 1'43" Variation 2'02" Intrigue
B1	2'21" Claustrophobia 2'48" Overwhelming 3'32" Breathing 4'08" Confusion 4'31" Escalation 4'49" Understanding

¹⁹⁰ There were two overriding themes that came about during the ontological listenings that are outlined in section 5.3.4.

¹⁹¹ These responses have also been noted on the full analysis of the work in appendix 4.

¹⁹² If some of these could be interpreted as being negative towards the work I would like to state that this is not the case. They were simply first reflective responses. The words that could be interpreted as having negative connotations are true responses that comment more on the emotional journey rather than any criticism of the composition of the work. This highlights the difference between emotions and mood in music as described by Meyer (1956: 7): *emotions* are temporary and evanescent, whilst *mood* is relatively permanent and stable. As Meyer states, "there are no pleasant or unpleasant emotions. There are only pleasant or unpleasant emotional experiences." (1956: 19).

	5'15" Acceptance 5'39" Immersion 6'10" Discomfort
C1	7'27" Wonderment 7'43" Anticipation
B2	7'57" Disturbance 8'34" Immersion 8'56" Building 9'13" Unfulfilling 9'33" Expectation 10'08" Left wanting 10'44" Submersion 11'27" Break 11'50" Waiting 12'08" Breakdown
D1	12'24" Interest 12'44" Anticipation 13'00" Questioning
B3	13'22" Discontent 13'44" Affirmation 14'22" Sink 15'09" Rest
C2	15'30" Awake
B4	15'51" Dream
C3	16'34" Stir
B5	17'02" Slumber 18'00" Meditation 18'21" Stars 19'09" Submersion
D2	19'48" Returning
C4	20'27" Surprise
B6	20'48" Decay
A2	21'13" Birth 21'32" Ascending 21'55" Unsettling 22'13" Longing 22'50" Disappearance

Table 5. Semantic responses for *Toupie dans le ciel*.

5.3.3.2 Reflection 8 – Overview of semantic responses

There are some interesting recurring themes and words within the segments listed in the Table 5. Much like the sound events section I will discuss each response based on the sections outlined in the syntax listening.

5.3.3.2.1 Semantic responses in A sections (overture & coda)

A number of common themes arose within the responses in both A1 and A2. These connections are not formed through synonyms, but antonyms. Falling/ascending, acceptance/longing are but two examples of how one might create these links. Being at apposing ends might seem to contradict my initial syntactical response that these sections form the overture & coda of the work. However, the concept of an overture & coda would account for two apposing forces holding objects (in this case content) together. These responses might explain why I grouped these sections initially beyond the syntactical reasons.

There were also a number of interesting concepts that arose within these sections, which ultimately had an effect on how I viewed the rest of the work. Many of these responses were already investigated within the open listenings. They included the idea of birth, accession and disembodiment. Whereas within section A1 I was somewhat reluctant to 'enter' the piece, by A2 I did not want to leave. I knew that it was the end of the work (because of the similarity in sound materials used) and because of my reactions within the other sections (particularly in the B sections) I

had become increasingly more comfortable with the musical nature of the work. A strange dichotomy is formed where I feel trepidation at the beginning, but a longing for it not to end.

5.3.3.2.2 Semantic responses in B sections (main motif)

The majority of my recorded responses were within the B sections of the work. This is not surprising since these sections are the largest and most prevalent within the work. That said these sections contained the most radical shifts in responses when compared to the others. Generally speaking the initial reactions to the sections were mostly negative. These changed as I became more accustomed to the work and my expectations changed accordingly. There were, however, a number of occasions where my responses were almost always negative. This occurred when the section was succeeded by another section (either C or D), or when there were internal changes within the section (an example of this occurs at 9'13" where I remarked 'unfulfilling' to an internal change). These were followed by usually more positive or neutral responses.

The main themes that were raised within these sections concern immersion and even sleep. After the initial shock of the sharp changes within the piece I soon became absorbed by the piece. Common themes such as submersion, sinking, slumber and meditation all arose during the semantic listening process. The idea of water is of interest as there is no sound source within the work that I perceived as

having the same characteristics of liquid either in its timbre or dynamics.

5.3.3.2.3 Semantic responses in C sections (interruptions)

The C sections have very few responses, mainly due to their short duration, but also because there was only one standard reaction – surprise. These sections come into the piece in such a way that this was the only reaction I could have. After the immersive sounds of the B sections I found it difficult to have an emotional response beyond the shock of their arrival. They do, of course, have an effect on my emotional response of the reemergence of the B section, which, as stated above, was often negative at first.

One interesting response and interplay between the B and C sections occurs at 15'09" to 17'02" (B3, C2, B4, C3 and B5) where the use of language conveys the idea of sleep states. Since these sections converge over a very short period of time I had one idea within my head, which at the time happened to be *sleep* (not to be confused with boredom, rather a deep mediation-like state). The interaction between these sections seemed to fit perfectly with this concept, moving back and forth between states of rest and disturbance (falling asleep and waking up).

5.3.3.2.4 Semantic responses in D sections (variations)

Both D sections function completely differently within the work and thus elicit two different responses. Section D1 emerges into the forefront of the work, eclipsing

the previous B section. As this is the first time one hears this sound it stirs reactions that question what is and might happen next. Section D2, on the other hand, enters in conjunction with a B section before they are both cut by the subsequent C section. In this instance the D section gives a sense of returning.

5.3.4 Ontological listening

There are two main narratives that I have interpreted from the work: amniosis/submersion and dreaming/meditation. Both have a similar composition concerning their semantic form discussed above, but have a different effect on me when listening. I often found that in different listenings my interpretation of narratives would shift between these two concepts¹⁹³.

5.3.4.1 Reflection 9 – Amniosis/submersion interpretation

The sense of drowning, immersion and birth all came about within the semantic responses (particularly towards the end). In this interpretation all the sections have a different function. The material used within the overture and coda is both the conception and birth of the piece (of course when considered outside of the listening flux). I noted within the opening listenings that section A1 drags the listener in, holding them until section B1 emerges. When section A2 occurs there is a sense of accession, of moving on. The polarity of the responses between the

¹⁹³ This is highlighted by the changes of focus within the semantic listenings.

overture & coda creates this theme of conception and birth.

The other sections, particularly the B ones, are what ground the piece. They draw the listener into a state of relaxation and submission. The interruptions and variations act as a means to regain the listener's attention, or to shock them into another, perhaps deeper immersion.

5.3.4.2 Reflection 10 – Dreaming/meditation interpretation

The section functions listed in reflection 9 work similarly in the dream/meditation interpretation; however, there is a greater emphasis on the B sections. These are the focus of this interpretation, having precedent over the other. The variations and interruptions only seem to jolt the listener out of their relaxed state as rude awakenings or even nightmares. The overture & coda also have less relevance in this interpretation and only function to indicate when the experience begins and ends.

5.3.4.3 Final remarks on ontological interpretations

The overall mood of the piece is one of tranquillity, of acceptance. There were many different emotions felt within the semantic listenings, some of which could be seen as completely contradicting the ontological interpretations listed above. What alleviates this divergence between emotions felt in the listening flux and the overall mood is the sensation, through the compositional structuring of the work, that there

is in fact some control, some planned destination.

The sensation of falling through space, unconditioned by any belief or knowledge as to the ultimate outcome, will, for instance, arouse highly unpleasant emotions. Yet a similar fall experienced as a parachute jump in an amusement park may, because of our belief in the presence of control and in the nature of the resolution, prove most pleasing (Meyer 1956: 20).

With this one loses him/herself within the music, accepting whatever musical fate might emerge. I found acceptance in the abrupt changes because I knew that there was some form of control, and with that I allowed the piece to engulf me.

5.3.5 Final open listening

The final listening occurred some months after the initial analysis. I wanted to get some distance from the piece in order to see if I still felt the same and if the multiple listenings (both open and specific) had fundamentally altered my understanding of the work. What I found was that the time between listening provided me with more time to reflect on the potential interpretations of the work, whilst always remaining fixed to this concept of amniosis, submersion, dreaming and mediation. However, these concepts were understood slightly differently within this final open listening, in fact the concepts were interpreted much more negatively. Here is my account of the final open listening:

As the piece begins the subtleties emerge (that were once hidden) and I feel in harmony with the piece, knowing its structure and evolution. Dynamics between

materials create a sensation of levitation, moving beyond one world to another – an electronic birth. I am floating into the stars and then falling into a deep sleep. The sky is littered with whales humming a lullaby whilst the stars sing out in unison measuring time and space. Only my conscious pulls me back to reality, but the longing for immersion is too great, too inviting to ignore. The deviations between the materials only feel like small divisions, tempting me to stray away from the entrancing aura. At points the piece changes its attractiveness. It begins to attack, ensuring I do not leave the space with which it has engulfed me. I am no longer a willing listener; it subjugates me removing my free will. This abandonment, although scary, is entirely gratifying. The piece removes the necessity to fight or ponder. Instead I am stuck by its charm, which is both embracing and smothering. I am aware of its control and it is both terrifying and soothing. It is tranquillising. I emerge at the end knowing full well what I've endured, and I accept it.

The difference between this listening and the other interpretations is that this combines both my initial frustrations with the changes in material and the immersion I felt throughout the prolonged sections of the work. This final interpretation is littered with contradictions, showing my inner turmoil as the piece gently toyed with me.

5.3.6 Comparison of outcome with poietic information

Toupie dans le ciel forms the last part of the cycle *Érosphère* (1978-80) along with

two other compositions, *La fin du bruit* and *Tremblement de terre très doux*; and two preludes *Éros bleu* (prelude to *La fin du bruit*) and *Éros noir* (prelude to *Toupie dans le ciel*). Each work deals with a different element of the intended meaning behind *Érosphère*, which Bayle (2012: 136) describes as "[following] an arc leading from everyday hubbub, angular and human, to a sky free from constraints". Although I was aware of the name of the piece and its meaning in English¹⁹⁴ I found that this did not have a great impact on my interpretation of the work. It is clear that there are some similarities in the interpretations (particularly when I wrote stars at 18'20") and even the narratives I deduced from the work, particularly in the final open listening in which the concept of levitation and stars emerged once again. Looking at the description from the CD *50 Ans d'acousmatique* that Bayle gives for the piece provides an explanation of the creation and intentions behind the work:

The substance of this extraordinary piece of music was developed from the actual sound of a spinning top, a melodic-rhythmic pattern, and simple electronic fluxes. There is an inversion of traditional modes of musical composition. While the high-pitches and the rhythmic swing remain imperturbably constant - which means it can be heard as minimalist – variations (stressing, de-synchronisation, variations in density and mobility, etc.) create constant movement, turning the sound material into something virtually *living*, constantly reaffirming itself, always the same yet renewed. Our attention is caught in a sound nest, defined in the bass by a rolling pedal, and in the treble by uninterrupted cooing, voluble and iridescent, that continuously swells and falls off. But if this music is a lullaby, it is the lullaby of the tiger! This protection conceals ferocity and threat all the more powerful because it does not show itself in the light of day. It is only interrupted by big sounds of rubbing rolling arcs, passing slowly, and sometimes triggering electric outbursts rising in zigzags. During these sound rifts (which the author calls skies), "the inexorable comes to an end, and suddenly freedom and lightness surges forth" (Bayle 2012: 139).

¹⁹⁴ *Toupie dans le ciel* translates to "toy top in the sky"; a reference to the Beatles track *Lucy in the Sky* (Bayle 1982).

Interestingly, many of the concepts raised within this phenomenological analysis have some relevance to Bayle's initial intentions. However, it was only in the final open listening, once I had some considerable distance from the initial analysis, that I begun to hear the veiled ferocity that the piece was trying to evoke¹⁹⁵. Admittedly after reading the dramaturgy for the work I was somewhat pleased that I had, through no prior knowledge of the composer's intention, partially understood the work through only my apprehension and indeed my effort to immerse myself into the work in order to uncover my own personal understanding.

As stated in the introduction of this subsection *Toupie dans le ciel* is a collection of five individual movements: *Éros noir* /1; *Toupie dans le ciel* parts 1,2 and 3; and *Éros noir* /2. Interestingly each part of the work aligns roughly with the sectional segmentation I did. Figure 23 shows each track and their relation to the overall structure found within the phenomenological analysis.

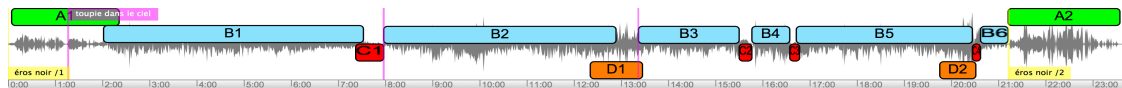


Figure 23. Overview of the sections within *Toupie dans le ciel* corresponding to movements.

The major exception to this was the cut midway through the overture where the initial part of the *Toupie dans le ciel* movements (not to be confused with the piece

¹⁹⁵ It was only through multiple listenings (focusing on different aspects of the work) and the final open listening that this intended meaning became apparent.

in its entirety) begins. Even through multiple listenings I still hear the overture (section A1) as a unified group of sound structures. The fact that Bayle has segmented the work in this way interests and bewilders me greatly. Materials from previous sections do overlap into others as can be seen in the overviews, but there is normally a principal section that dictates a change in the mood or direction of the work. The change that occurs within Bayle's segmentation for me is overshadowed by the introduction of the first instance of the main motif (section B1), making it a bizarre choice for me.

5.3.7 Relevance to the 2008 *PRÉSENCES électronique* concert

How does this investigation inform my understanding of the audience's reaction at the 2008 *PRÉSENCES électronique* concert? There are a number of aspects that could be assumed based on my understanding and interpretation of the work. The first and most important aspect, already discussed extensively within this phenomenological analysis, is the work's immersive and hypnotic nature. Many of the audience members were visually entranced by the work, closing their eyes and leaning back in their chairs, completely absorbed by the piece; bringing me to my second observation.

The concert hall *salle Olivier-Messiaen* is a classic stage-facing auditorium. All the seats are on an incline allowing for a better view of the stage, but not necessarily providing the most even listening conditions. Interestingly, the height of the concert

hall, although not again necessarily ideal for sound projection, is visually impressive. When Bayle was diffusing the piece there was a strong sense of height, perhaps because of the way he projected the work, but I suspect that the composition of the work aided with this sensation (particularly the higher frequencies); bringing me to my final remark of the concert experience.

People who have experienced a *PRÉSENCES électronique* concert will know that, unlike the other traditional acousmatic concerts held by the GRM, a lot of consideration is put into the lighting and set design of the stage; what the French would call the *mise en scène*. The spectacle acts somewhat counterintuitive to other acousmatic concerts that aim to put more emphasis on sound immersion; however, this only increased the immersive nature of *Toupie dans le ciel*, arguably allowing for inexperienced listeners another factor to hold onto (Landy 1994).

Combining the sensation of height, the reaction of the audience and the staging of the event (which I would argue is of a futuristic aesthetic) gave me the impression that we were all within a planetarium, viewing the constellations and comets passing overhead. No better analogy could exist for the performance of a work called *Toupie dans le ciel*. I am, of course, assuming that the staging and lighting were developed to give this impression even though there were other performers that same night. I cannot know whether this was done intentionally, but it seemed to me that the lighting enhanced the star like experience I am referring to. This

worked extremely well in drawing in the audience, first perhaps with the visual stimulus and then with the immersive nature of the work itself.

5.3.8 Closing statements

In conducting my analysis I have found an answer to my initial question. Whether the response is in fact my interpretation of events within the *PRÉSENCES électronique* concert, or if indeed this is the reason why the audience reacted in the way they did is certainly debatable. All of my findings, apart from the discussion of poietic information, are derived from my phenomenological experience and ultimately linked to my own personal understanding of the piece; one that I am then using to affirm my understanding with the intentional meaning outlined by Bayle upon the concertgoers. It could certainly be argued that this is nothing more than confirmation bias¹⁹⁶ on my part, but then again I would never truly know the truth behind the feelings and potential interpretations of the listeners that night. I can only estimate what the effect of the piece and its placement within the concert series might have had on the listeners and nothing more.

¹⁹⁶ *Confirmation bias* refers to one's tendency to favour evidence that fits his or her initial beliefs.

5.4 Analysis of *Times Square* by Max Neuhaus

Analysing the *Times Square* installation by Max Neuhaus was a particularly difficult endeavour. For one there was no fixed object of study, only my memory of my experience of the installation, one that was, arguably, fallible and romanticised. In order to provide some fixity for the analysis (not just for me but also the potential reader who might not have experienced the installation themselves) I decided that it would be necessary to have a tangible object of study beyond just my memory of the event. This took form in a spoken monologue, which I then transcribed below. The monologue provides a description of the installation, my personal experience of it and the context of my visit.

Beyond the monologue I will also be using videos and sounds of the installation as part of this analysis. However, these have not been used prior to the monologue to ensure that the documented experience it as authentic to the memory as can be.

5.4.1 Monologue (object of study)

This is the monologue for my experience of the *Times Square* installation in New York City. The description of my experience of this installation will be the object of study for my analysis of the installation. There are a number of things that I need to discuss in order to give some context to my experience of this installation, which will hopefully (for the reader) explain how and why I experienced it this way. I have

decided to split the monologue into three areas: background and intentionality, finding the installation and the experience of Times Square (the place)¹⁹⁷ and experiencing the work; in order to provide some structure.

5.4.1.1 Background and intentionality

I went to see the *Times Square* installation on the 20th of November 2011. This was not a trip intended to visit the installation, rather it was a planned vacation before the Christmas period. It was the first time I had been to New York City, but not the first time that I had visited America. Because of this there are a number of factors that affected my experience of this particular installation. One in particular is that I was aware of the installation and of Neuhaus' work, but wasn't going specifically to see it. In fact when I did experience the installation it was a very short experience (roughly about five minutes). That said I still experienced the work, which I feel is sufficient to discuss my interpretations.

The hotel I was staying in was just off Times Square. The installation was roughly a block away from the hotel; however, I only went to experience it once. It only became apparent to me later after the visit that it might be useful to do an analysis of an open-form work like *Times Square*, as it does not have a fixed object of study. It is also what one might term an experiential work; one that you have to

¹⁹⁷ Italics will be used to denote the installation and to differentiate it with the place in the analysis.

experience for yourself. Furthermore, it is a site-specific installation, meaning one needs to go to the place in which it is housed rather than attempting to experience it through digital artefacts, which ultimately cannot provide the same experience as actually witnessing it for yourself.

I visited the installation on my own. My companion at the time was visiting other amusements on Times Square. This meant that I was very aware of time passing by. I was aware that I couldn't stay and immerse myself fully in the installation for as long as I might otherwise have done. I had to be aware of the time limit I had set myself. This added some barriers with regards to my appreciation and experience of the work. Ideally it would have been pertinent to have enough time to fully immerse myself in the installation and not to be confined by the time limits set up by social etiquette.

5.4.1.2 The experience of Times Square and finding the installation

Initially I was rather confused when trying to find the particular point in Times Square where the installation was housed. There are two islands where it could potentially have been. I had researched its location prior to my visit, yet I still needed to find it because of the sheer size of Times Square. This meant that I got to experience Times Square itself.

I assumed before visiting Times Square that this sound environment would be

rather loud. However, I found that, perhaps for that time of year and the time of day, it was a rather quiet environment considering it was a hub of activity in the centre of a large metropolis. The way it is set up means that the cars are either side of you. There are neon lights and various other visual stimuli and these seem to dominate one's experience of Times Square. We are visual creatures by nature and I did find that Times Square was a very visually impactful environment. Advertisements, neon signs, stock exchange information were all very apparent upon first entering. The sound environment was certainly a secondary element to that experience. I was much more aware of the people and activity around me visually than sonically. This visit took place around 1pm, so in Manhattan it was probably prime lunchtime and prime time for tourists to buy tickets for shows that were on sale in the concession stand situated on the opposite island of Times Square.

It soon became apparent that I would need to change my focus in order to find the installation. With all this activity one could get lost in the cacophony of sounds and images, which were interplaying with one another in a mad dance. I noticed that I had embraced an *ouïr* listening mode, since my brain had become overloaded with information. Consequently I adopted an *écouter* listening attitude in an attempt to concentrate on the sounds around me and to locate the installation. This orientation soon shifted as I began to become interested in the sounds of the

square. I became a *flâneur*¹⁹⁸, studying every aspect of Times Square in search of the installation. The sounds, the buzz of traffic, the noise of commuters became the forefront of my experience. Rather than just considering the visual aspects of the space I was beginning to make connections between sounds and their causality.

I moved to where I thought the installation was. As I got closer I began to hear the sound that I knew was the actual work¹⁹⁹. I oriented myself to the middle of the grate before changing my perspective and listening orientation once again.

5.4.1.3 Experiencing the work

Upon finding the installation I noticed that my perspective of the square as a whole completely changed. The sounds of the installation transported me away from this touristic and visual perspective of Times Square and I began to only be interested in the visual activity that existed within the invisible walls it created.

I stood in the middle of the grate underneath which the speakers were housed. I noticed that I was one of the only people to stay there and experience the installation. Many other passersby were using this grate and walkway to cross the street, none of whom seemed to show they had understanding that there was an

¹⁹⁸ A *flâneur* is someone who saunters around observing society.

¹⁹⁹ Notwithstanding my declaration above that I minimised prior information about this installation. In fact Dr Peter Batchelor had drawn the whole project to my attention in a lecture on sound installations a few years before. I thus had a memory of the kind of sound I was searching out.

installation or indeed an interpolated nonlocal sound emanating from underneath them. This almost gave me an aerial view of Manhattan and Times Square, feeling that I was the only one experiencing the installation, that I was in the know and no one else was. The sounds elevated me above the crowd, the visual aspects and the sounds of the city. That said, because my hearing became my primary sense in that experience I started to notice the sounds of the square. I started to notice what people were saying, what origin their native tongue was, the sounds of cars close by and even in the distance, the music of the advertisements, much of which was subconsciously projected as a marketing tool with the visuals as the main sense.

The frequencies of the installation were clearly audible, but subtle and convincing enough to be deemed as a city sound by many. Its timbre is very distinct but hard to distinguish, from other sounds, in the sonic environment within which it sounds. I would describe the sound as a prolonged pitched drone, one that is of a low frequency. It is a true drone, as it does not change rapidly in its envelope or intensity, rather it oscillates in amplitude gently, giving it interest and plausibility. For all these reasons this installation needs to be found by those who are open to it or who are aware. It is difficult to consider the possibility of stumbling across this installation because it is not marked in any way and only somebody with a particularly acute hearing might distinguish the sound from the cacophony that already exists within Times Square.

The frequencies alternate as one moves over the grate. I am unsure whether this is because of changes in the acoustics of the space in which it is housed, or because of speakers used within the installation colour or project the sound differently. I deduce that this means many different people, both aware and unaware, can have very different experiences of the same installation. The frequencies move and engulf me like a wave emerging from below, slowly cooling me as it washes over me.

There is little variation in the sonic content of the installation. It feels more like a beam or wall of sound emanating from underneath. The variation occurs when one moves through the space, through the invisible walls projected from the grate. There is a real sense of entering into a different place, an elevated place – a place serene, tranquil and a potentially safe environment. The impactful nature of Times Square loses its initial ferocity. The sound creates a barrier to the potential overload of visual and even secondary sound elements within the space. It is like an oasis in a metropolis, cleansing the ears of the unrelenting noise.

You start to notice yourself in the environment. How you're situated in it, what you are wearing and who you are in that space. It acts as a mirror to oneself, a third perspective, reflecting your existence in that moment, transporting you away. You not only notice yourself but everyone else around you. What they are doing, who they are, how they present themselves.

Upon leaving the installation I felt as if I was stepping down from a watchtower, back into the real world. Removing myself from the sanctuary provided by the sounds. One that is inviting and calm; back into the real world of uncertainty and noise. The sounds return to their initial secondary sense. The visuals overtake and I'm back on Times Square.

5.4.2 Analysing *Times Square*

The act of providing a monologue of my experience is not only to give the reader a sense of the work, but also to provide fixity for the analysis. Using this and other material I will attempt to analyse the work in three main areas: listening focus, interpretations and the sound of the installation.

5.4.2.1 Change in listening focus

My listening focus (as documented within the monologue) changed drastically throughout the experience. I stated previously that I took on the role of a *flâneur* in an attempt to find the installation and to orientate myself within Times Square. In doing so other sounds became more prominent within the environment. These subtle changes, although slight, completely altered my experience and appreciation of not only the installation, but also the place in which it was housed. Using the monologue above I have constructed a listening path starting from my first experiences of Times Square to finally finding and experiencing the installation.

Table 6 provides a simplified explanation of the listening experience using Schaeffer's (1966: 116) *quatre écoutes*. I have chosen to segment my experience into five main areas to better understand how my listening changed throughout the experience²⁰⁰.

Finding		Experiencing		
First experience of Times Square	Attempting to find the installation	Upon finding the installation	Forming an understanding	Leaving the installation
<i>Ouïr</i>	<i>Écouter/Entendre</i>	<i>Entendre</i>	<i>Comprendre</i>	<i>Entendre/Ouïr</i>

Table 6. Listening progression throughout my experience of *Times Square*.

The *finding* part of my experience is perhaps the one that is easiest to segment. As my initial intentions were to find the installation quickly changed from an *ouïr* listening orientation to *écouter* as I began my search. I could also comment that I was in both a state of “listening-in-search”²⁰¹ and “listening-in-readiness”²⁰² (Truax 2001: 22), particularly between the change of a *ouïr* listening orientation to *écouter*. More importantly though I began to focus on the other sounds of Times Square, many of which I would have ignored if I were not in search of the installation. I did not consider these sounds to have any value other than comprehending their

²⁰⁰ Of course some of these listening modes can coexist (*ouïr* and *écouter* arguably not), so the table will document the leading listening mode at that particular time of the experience.

²⁰¹ Truax (2001: 22) describes this listening state as an active search for sonic cues where a listener focuses closely on individual sounds in order to discern them from others.

²⁰² *Listening-in-readiness* is described by Truax (2001: 22) as “[...] an intermediate kind of listening, that in which the attention is in readiness to receive significant information, but where the focus of one’s attention is probably directed elsewhere”.

origins, so for these first instances of the experience I was not hearing the sounds as musical elements. It was only upon hearing the installation that my mentality to the sound environment changed. Rather than being concerned with finding the installation I could begin to appreciate the sounds by shifting to an *entendre* listening inclination. My focus shifted from the usual sounds of Times Square to the drone emanating from the grate. This focus, however, did not remain on the sound of the installation, which then became a backdrop to the other sounds within the square reducing it to "background listening" (Truax 2001: 24) allowing for the sounds of the square to become the focus. As the sounds of the square became more acute I moved towards a *comprendre* listening attitude, forming my understanding of the installation experience. Interestingly this effect of listening to the sounds of Times Square stayed with me when I left the installation moving back to an *entendre* listening viewpoint. After a while however my listening shifted back to an *ouïr* attitude once this initial appreciation of the work wore off.

These shifts in listening focus are intrinsic to the piece's success. I was perhaps not the ideal candidate to experience the true enlightenment that the work can bestow, as I was in search of it knowing full well that it indeed existed. For those listeners who could experience it in a naive way the listening experience, I imagine, would be entirely different. Their listening focus would, firstly, not include the *écouter* listening orientation that I adopted in my search for the work. My slow escalation of listening states meant that my discovery of the work did not permit me

to experience the sudden eureka moment that some unsuspecting listeners might have. The listening experience I had was indeed much more subtle, but personal nonetheless. Secondly, many listeners will experience the installation, perhaps considering the sound as bizarre, but ultimately disregarding it as some mysterious occurrence never moving towards a *comprendre* listening attitude; probably attributing it to some unseen mechanical phenomena. Once again this is something, knowing the installation exists, that I could never experience. My listening experience was that of knower, someone who knew of the installation's existence, which fundamentally altered my perception. Rather than a eureka moment my listening pleasure was in a feeling of superiority; that I was the only one aware of the work that the unsuspecting audience members and I were experiencing.

5.4.2.2 My interpretations of the work

There are two main interpretations that I had upon further reflection after experiencing the work and documenting my experience. Particularly within the *comprendre* listening part of my experience I developed strong interpretations as to what the piece was evoking. These interpretations were not formed from a collective response to the work as I certainly felt I was the only one listening at that particular moment.

5.4.2.2.1 The looking-glass/magnifying glass interpretation

Almost like a mirror I began to notice the people around me. I quickly changed from a *flâneur* to a *voyeur* once I had found the installation and immersed myself in the sound. The mirror not only reflected the people and things around me in a different light, but it also showed me how I existed within that space in that time. These elements already existed within the space, but were ignored mainly through my *ouïr* listening orientation. The installation focused my attention to the details that had always been there, but were ignored. As Cage (1961: 23) learnt from his visit to an anechoic chamber there is no such thing as silence. His piece 4'33" could be considered the exact opposite of this work in both its composition and intention. Whereas Cage's intention was to make an audience aware of the sounds around by not (intentionally) making a noise; *Time Square*, an installation where a drone is constantly audible, can be dismissed as being what Neuhaus (In Vergne et al. 2009 front endpaper) refers to as "unusual machinery sound from below ground". "Audible but unobtrusive", streaming continuously and "experienced by visitors and passersby at particular moments" (Cox 2009: 124). In doing so it acts as a magnifying glass to all the other sounds around you, making you aware of everything you were not noticing previously.

This interpretation may only be applicable to those listeners who know of the installations existence. To them the sound would be the main focus of their listening experience, rather than acting as a magnifying glass to all the other

sounds in the vicinity.

5.4.2.2.2 The island interpretation

The island interpretation is one in which I refer to the sense of finding a serene environment, what I termed an oasis, within the noise and hubbub that exists within Times Square. In this instance however the island is, metaphorically, floating above the rest of the city. A safe haven within, what can be for many people, a daunting place. Feeling completely separate from the rest of the people on Times Square was a surprisingly enjoyable sensation. The safety the invisible walls granted me was unlike any other experience I have had with a public installation. This new perspective of the space works adjacently to the looking-glass/magnifying-glass interpretation detailed above. Conversely, these invisible walls act as a barrier, allowing me to focus on particular sounds of the city of my own accord and not because of their ferocity.

5.4.2.3 Considering the sound of the installation

Up until this point I have avoided discussing in too much depth the sound of the installation. The main reason for this choice is that the sound, unlike the other works analysed within this thesis, is not the only factor that contributes to the experience of the installation. Outside of the installation the sound is just a drone, one that perhaps would not be of much interest to many listeners outside its intended context. However within the installation it takes on another form. It engulfs

the listener, changing their entire perspective of Times Square and the sounds that exist around it.

The sound is not just projected from speakers, rather it becomes one with the environment. It sounds “plausible”, as if the sounds could be produced naturally (or indeed mechanically) by the subway ventilation shaft from which they emanate (Kotz 2009: 93). Joseph (2009: 68) remarks that the sounds of the installation are “electronically processed traffic sounds”, which further resemble the sounds that might issue from the “kinds of machinery expected to exist beneath such metal grates”. But this is not the only effect that the sound has on a listener, as documented thus far in this analysis. It politely invades a person’s listening environment, prompting them to use their ears and not succumb to the distractive nature of Times Square.

Taking a closer look at the drone itself, from the recordings available through the Neuhaus website²⁰³, I began to discover the drone is formed from an arithmetic sequence, adding 146Hz from the fundamental frequency 73Hz in each step²⁰⁴. However, rather than having all these frequencies sound at once Neuhaus used what I imagine to be some form of amplitude modulation whilst deviating slightly from the true arithmetic sequence. This creates an warm drone, rather than a

²⁰³ <http://www.max-neuhaus.info/audio-video/>

²⁰⁴ 73 Hz, 219 Hz, 365 Hz, 511 Hz, 657 Hz, 803 Hz, 949 Hz, 1095 Hz, etc.

formulaic and true mathematical realisation of the series. It can be perceived in the slight oscillations in amplitude that can be heard on the many recordings found online. To test this theory I attempted to recreate the sound of the installation using Max/MSP and some basic triangle wave generators. Using the following sequence: 73Hz, 219.1Hz, 364.8Hz, 510.9Hz and 656.8Hz; and by applying a simplistic form of amplitude modulation, I created a somewhat convincing likeness for the drone found within the installation. What is lacking from this recreation is the richness in timbre achieved by Neuhaus, which I can only surmise is through some subtle but nevertheless complex frequency modulation.

Of course the tone itself is not the only aspect of the sound that one should consider. “The sound that is heard on the surface is not just the sound that I’m putting in here; it is what the sound does to this chamber” (Neuhaus 2002 quoted from *Max Neuhaus – Times Squares*). The shaft, in which the speakers are housed, resonates with the drone, creating pockets of equalized sound (as can be seen in Figure 24). Not only can a listener choose the length of the experience, but also, to some extent, they can alter the sounds of the installation by simply moving around the grate. This means that the work is in constant performance, both in the changes in external sounds and the audience’s participation.

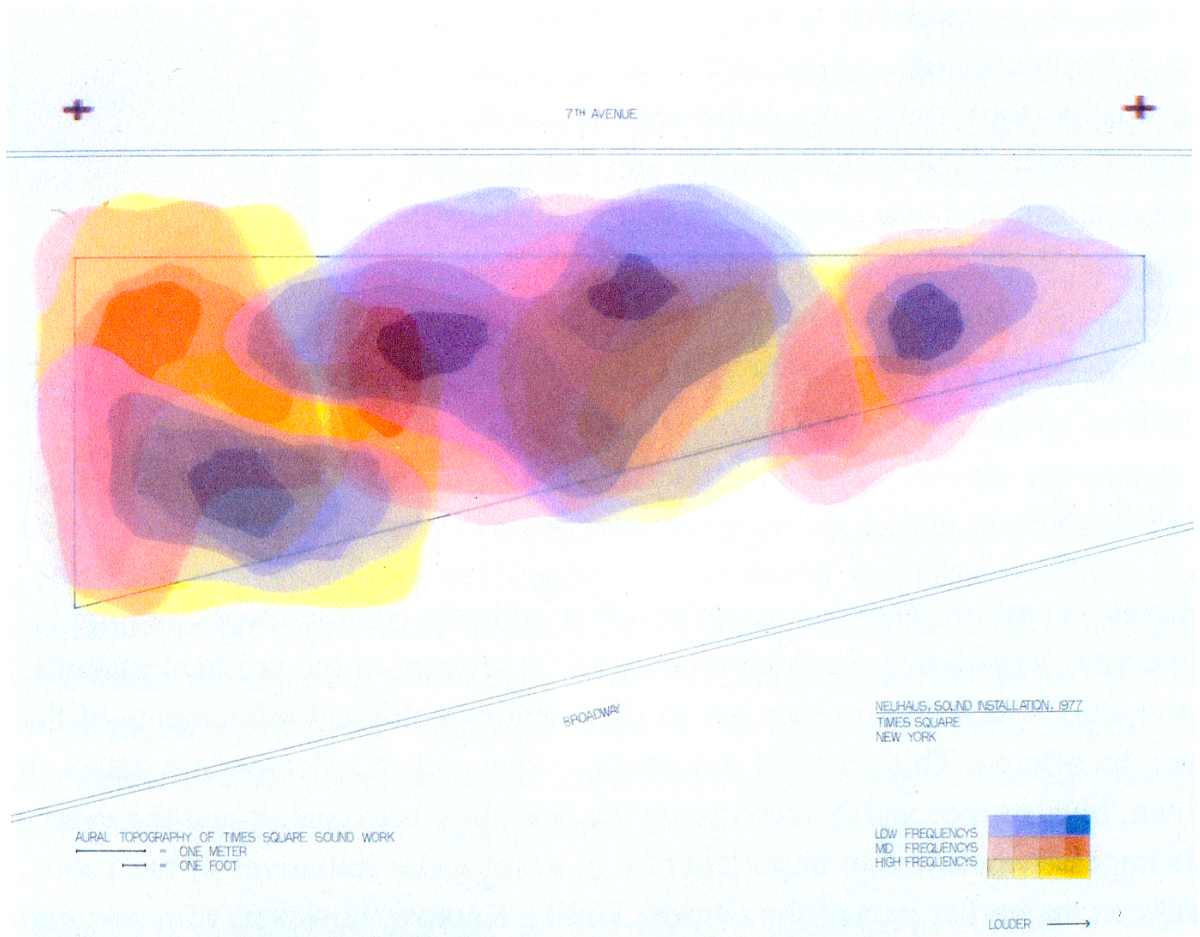


Figure 24. Rendering of the aural topography of *Times Square* (1977) taken from Potts (2009: 49).

Within Schafer and Kerbs' (2003: 216) definition *Times Square* would be a "Space-soundObject" installation – a two-dimensional arrangement of the loudspeakers, which radiate sound in *one* direction. However, what is interesting about *Times Square* is that the sound is actually resonating the space, so in actual fact the upward projection of the sound is achieved by the space and the speaker arrangement within.

5.4.3 Closing statements

I have tried, to the best of my ability, to analyse an open-form site-specific installation without any concrete object of study upon which to base my investigation. In turn I have devised my own analytical strategy, using a monologue to record my experience of the installation. Other sources have been used, such as videos and diagrams, but the majority of the analysis has been completed through memory. The result is an experiential analysis, one that is more concerned with an interpretation of the event rather than the analysis of the sound.

Times square will indeed evoke different interpretations from listeners, some of whom will never know they were even a part of the installation experience.

It is not meant to startle, it is meant for people who are ready to discover. In fact I never knew a work where everybody stops and notices it in a public place. I want at least 50% of the people to walk through it without even noticing it, without hearing it (Neuhaus 2002 quoted from *Max Neuhaus – Times Squares*)

Neuhaus (In Vergne et al. 2009 front endpaper) notes that for those “who find it and accept the sound’s impossibility, the island becomes a different place, separate, but including its surroundings” and that “having no way of knowing that it has been deliberately made, usually claim the work as a place of their own discovering”.

5.5 Analysis of *Imago* by Trevor Wishart

The final analysis of this chapter is of Trevor Wishart's *Imago*. This piece has been chosen not necessarily for its composition, although of course this in itself is interesting (and will be discussed within this analysis), rather for the fact that Wishart provides a very precise account of how he composed the work and the intentions behind it²⁰⁵. Much of the information pertaining to the work is documented within his book *Sound Composition* (2012) in which he meticulously discusses many of his pieces explaining his intentions and compositional techniques.

Unlike the other analyses in this thesis this investigation will start with Wishart's intentions and methodologies before considering if they are relevant to my own personal perception of the work. Firstly I attempted to gain an understanding of the compositional procedures and intentions of Wishart through the poietic information before I applied Roy's *grille fonctionnelle* using my own perception, which was influenced by the knowledge I gained through Wishart's writings. Therefore, this analysis will be poietically rather than esthesically lead. The intention of this analysis is firstly to investigate whether having access to poietic materials of the work affect an analyst's perspective. Secondly, the analysis will attempt to

²⁰⁵ This analysis will attempt to offset this thesis's focus on the listener's perception and to address Zattra's (2004: 37) comment that analysts concentrate on their perception of an electroacoustic work "neglect the creation phase".

determine whether Wishart's intentions are audible with the aid of the compositional notes and understanding. Finally, since the work is composed from one single sonic entity, which is less than 1/10th of a second in duration (Wishart 2012: 101), the focus of the analysis will also consider the structural relationships of the sound events by applying Roy's *grille fonctionnelle* to *Imago* with the aid of one of Wishart's diffusion scores²⁰⁶.

5.5.1 The poietic information of *Imago*

To better understand the work I have consulted his book *Sound Composition* (2012), which contains an accompanying CD with examples of the sounds used within many of his works, including *Imago*. I have also referred to Wishart's other publications. These were written before the creation of *Imago*, but have certainly aided me in understanding his compositional style. The findings from the poietic investigation have been split into three main sections: Wishart's compositional intentions, common themes and compositional processes.

5.5.1.1 Wishart's compositional intentions

Much like his compositional process (Wishart 2012: 101) the work is a systematic exploration of a single sound source and the potential musical possibilities. However, *Imago* was specifically composed to challenge the conception that

²⁰⁶ Which will become one of the objects of study within this investigation, along with the fixed-media work.

electroacoustic works do not follow any compositional logic, appearing only to only have “one single musical line” (Wishart 2012: 101). By using just one sound Wishart has developed a range of gestures, textures (and even some mimetic references to the utterances of birds and humans) through the use of computer manipulation. Following classical music development Wishart first plays the original sound source and slowly demonstrates how this one sound could be used to create an entire piece. The outcome of this compositional endeavour is a “gradual metamorphosis of one sound or soundscape into another”, which he hopes are “clearly audible” (Wishart 2012: 102).

5.5.1.2 Common themes

Some common themes emerge throughout the work, particularly in relation to metaphor and its inherent symbolism, or as Wishart (1986: 165) refers to it, the *sound-image*. Usually Wishart puts great emphasis on the use of sound-images in building structures within a work:

In order to build up a complex metaphoric network we have to begin somewhere. We need to establish a set of metaphoric primitives which the listener might reasonably be expected to recognise and relate to. Just as in the structure of myth, we need to use symbols which are reasonably unambiguous to a large number of people (Wishart 1996: 169).

Although some sound-images emerge within the work (birds, machines, waves and

human utterances)²⁰⁷ Wishart does not stress any great importance within his writings on *Imago*²⁰⁸, referring to them as “sonic allusions” (Wishart 2012: 107). This might be because all the sound-images are mimetic by nature. Therefore, Wishart most likely wanted to demonstrate that electroacoustic works could have logical musical progression through spectromorphological chains and not metaphorical ones. Considering this the mimetic sound-images that exist within *Imago* are intended to be “structural markers” (Wishart 2012: 102) that are easily recognisable and memorable, providing a “memory-trace” and potentially a “sense of expectation” (Wishart 2012: 109). Since the entire work is built up of repetitions of small structures having such sonic markers helps the listener recall previous passages, perhaps aiding them to understand the gradual metamorphosis that he is trying to evoke.

Wishart also produces larger structural references to real-world sound sources beyond the direct mimetic references discussed above. These consist of what he refers to as: *the gamelan*, *the oracle* and *the fugu and the sea*. Each of these sections employ a different compositional processes and appears throughout the

²⁰⁷ From Wishart’s other works we know that certain sounds (within specific contexts and compositions) have the capacity to symbolise (for him) different meanings. For example, birds represent flight, freedom and imagination, whilst *machine* sounds symbolise factory, industrial society and mechanism (Wishart 1986: 169).

²⁰⁸ The majority of information provided by Wishart within *Sound Composition* concerns the composition of *Imago* and not the metaphorical relevances of the sound-images he creates.

work at multiple times²⁰⁹ either as large rounded sections or as discrete sonic markers hidden within the background of other sections.

5.5.1.3 Compositional processes

There is a range of compositional processes Wishart employs to produce such a wide variety of sound events from one single sonic entity. These range from very simple motifs (which make multiple appearances throughout the piece) to larger textures and event structures. The majority of the original sound material is created from the original short sonic entity itself²¹⁰ (Wishart 2012: 103), or from the motif²¹¹ that is first introduced at 0'10". Wishart then further manipulates these sound transformations to build up a whole range of sound events.

The original single sonic entity is manipulated in a number of ways, specifically time stretching. "For a more inharmonic result we freeze the spectrum near the start of the sound; for a more pitched result, we freeze it near the sound's end" (Wishart 2012: 103). These new sounds must then be "re-enveloped" to the original "loudness contour" to "retain the attack-resonance morphology" (Wishart 2012: 104). To create even richer sounds Wishart "transposes a number of copies", of the

²⁰⁹ The larger sections in which these concepts are explored occur at 20'11", 18'42" and 13'03" respectively. Both the sounds that constitute the *gamelan* and the *oracle* sections occur more than once within the work, whereas the waves from the *fugu and the sea* only appear once.

²¹⁰ Which is first heard at the beginning of the work.

²¹¹ The word *motif* is used by Wishart (2012: 101) to describe a short instance of five transposed attacks of the original sonic entity introduced at the beginning of the work.

same sound “on top of one another so that their attacks are absolutely in synchronisation” (Wishart 2012: 104); creating “harmonic stacks” (Wishart 2012: 105). As these new spectrally rich sounds have the same attack we perceive them as a “single percept” (Wishart 2012: 104). By employing these techniques Wishart creates a number of different sound archetypes from pitched notes²¹², bells²¹³ and rhythmic strikes²¹⁴ (which later form the main part of the gamelan sections).

Using the simple motif (first introduced at 0’10”) Wishart creates complex textures that verge on the edge of being perceived as single perceptual sonic entities or a single complex nodal sound (the first example of this can be heard at 1’10”). Two main transformations are applied to the simple motif: spatialisation, to help “characterise individual musical streams in counter streams”²¹⁵ (Wishart 2012: 104); and processes of *accelerando* and *rallentando*²¹⁶, creating a rising or falling pitch depending on the speed to give “a sense of forward momentum” (Wishart 2012: 105). Like the transformations formed from the single sonic entity the ones achieved with the motif are then again manipulated to give even more sonic

²¹² Pitched notes are less common within the work and are created with the tail of the original sonic entity. The first instance where a pitched note can be heard within the work takes place at 2’43”.

²¹³ The first bell strike is heard at 1’26” and is used repeatedly through the work to signal changes, both structurally and locally within larger units. The use of the bell as a structural device will be discussed in more depth in section 5.5.3.2.

²¹⁴ The rhythmic strikes that appear throughout the work, particularly in the gamelan sections, are introduced within the piece through slow transformations. The first rhythmical strikes occur at 2’38” after a gradual change in sonic material.

²¹⁵ The first use of spatialised sounds as a compositional process to create counter streams occurs at 1’26”.

²¹⁶ Wishart uses these two processes throughout the work; the first examples can be heard at 0’11” and 0’31” respectively.

variety.

As previously stated there are a number of recurring sounds that create “sonic allusion” (Wishart 2012: 107) that act as “structural markers” (Wishart 2012: 102) within the work; the first of these is what Wishart refers to as the *fugu* sound²¹⁷. It is made by “first making a time-reversed copy of the sound, then splicing this copy onto the start of the original” (Wishart 2012: 106). What is interesting about the *fugu* sound is that throughout the work the sound slowly emerges as higher frequencies become more prominent. A consequence of this is that it creates a doppler-like effect, producing “spatial implications” (Wishart 2012: 107) beyond the actual spatialisation of the sound within the stereo space.

The birdsong²¹⁸ is made, like the vocal utterances²¹⁹, from the original sonic entity by pitch-sliding the tail (Wishart 2012: 107). “As the loudness of the tail is rapidly decreasing and its spectrum rapidly changing, if we read rapidly back and forth at random along this tail the sound level and spectral-brightness rise and fall with the back and forth reading, making the sound ‘flutter’ in quality and level” (Wishart 2012: 101). This sonic illusion of the birds is enforced when he creates “flocking textures” within a “narrow range of pitches”, mimicking the sound of flocking birds

²¹⁷ The first example can be found at 1’16”.

²¹⁸ The first instance appears early within the work at 1’56”.

²¹⁹ These first appear later in the piece at 18’44”.

(Wishart 2012: 108). Vocal utterances are “produced by using time-varying filters which mimic the behaviour of vowels” (Wishart 2012: 110).

Other sounds, like the gamelan rhythm²²⁰ are “constructed in the traditional way, using rhythmic layers which have tempi in multiples of 2 [two]” (Wishart 2012: 110). The waves that appear at 12’24” are created by contracting the simple motif to the point that the sound becomes “very gritty in quality as the attacks become extremely close”, which “metamorphoses into the allusion of breaking waves” (Wishart 2012: 111).

One of the most important sounds within the work is what Wishart refers to as the *dipper* (first heard at 1’27”), which acts as an “anacrusis event” throughout the piece, signalling the emergence of new material (Wishart 2012: 107). This is the transformed simple motif sound that moves towards a percussive timbre before changing back to a collection of pitched notes at various speeds.

Beyond the sonic markers and the various larger sections of the work Wishart also performs other transformations on the sounds, such as: tremolo and vibrato (Wishart 2012: 108), reverberation (Wishart 2012: 105) and spectral blurring (Wishart 2012: 109). Many of these processes are intended to add depth to the

²²⁰ Which first occurs at 5’21” and throughout the work at various points before a whole unit is devoted to its development at 20’11”.

piece, specifically spectral blurring, which Wishart uses on the sonic markers so that they only appear in the background of the work before they emerge as intended later²²¹.

5.5.2 Structural analysis – applying the *grille fonctionnelle* to *Imago*

As stated previously I will be applying Roy's *grille fonctionnelle* tool to define the structural relationships within the work using my perception and the knowledge obtained through the poietic information. To provide an understanding of the sound events (and even some of the lower level event relationships) within the work a transcription score created by Wishart, which was used initially as a diffusion score (Wishart 2012: 169-173), has been added to the visual outcome of this investigation. Within the transcription Wishart provides many symbols and notes that will form the neutral level of the analysis, which Roy states is needed before the *grille fonctionnelle* notational terms can be added (Roy 2003: 340). Furthermore, using the segmentation outlined in his book *Sound Composition* (2012), I will be adding the two paragraphs he refers to as a beginning point for the higher-level structural analysis. It should be mentioned that Wishart states that the work is made up of a multitude of paragraphs²²² (Wishart 2012: 102) but only discusses the first paragraph in detail (0'00"-2'53"). He splits this first paragraph

²²¹ This is again to provide a "memory trace" and to create the "sense of expectation" Wishart is trying to achieve (Wishart 2012: 109).

²²² Which Roy would refer to as *units* (Roy 2003: 2010).

into six sections for which he outlines many of the processes that will occur throughout the piece, building expectation and the understanding of the original sound manipulations. After which only paragraph two is mentioned with general reference to other materials within the work²²³. Therefore, I will need to investigate and apply the higher-level structures as well.

5.5.2.1 Event structures within *Imago*

Of particular interest are the sonic markers that Wishart refers to within his writings. These form some of the memorable moments within the work and act as *announcement* and *reminders* within Roy's function symbols (see below in Table 7 for a description of these and other functions used within the analysis). For example, the gamelan sound occurs at 5'21", 10'10", 14'38", 14'53" and at 15'19" before it finally emerges uninterrupted at 20'10". Conversely the wave sound only appears once throughout the entire piece (12'53"), but for a prolonged period of time. As all these mimetic sounds act as sonic markers they fall under the *indice* function within the *grille fonctionnelle* framework. However, the *dipper* sound that Wishart uses throughout the work did not function as an anacrusis event within my perception, often falling into the background, even though I was aware of its significance. This might have been because it was amongst other similar sounds at a particular sub-section that Wishart refers to as the "spectral cauldron", which first

²²³ Wishart (2012: 102) states that he "won't attempt to discuss every facet of the work" within the book.




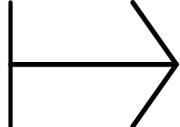
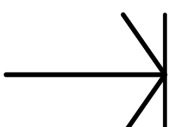
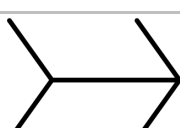



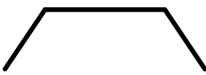
occurs at 1'27". Here the *dipper* sound is first introduced amongst many other spatialised sounds that follow a similar morphology and timbre, making it appear for me to be not as unique as the other sonic markers. For me it was the distinct bell sounds that acted more like anacrusis events, as these acted as *figures* within the work, polarising other elements around them whilst signalling new progressions.


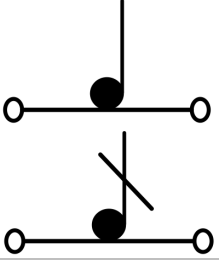
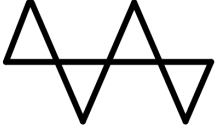

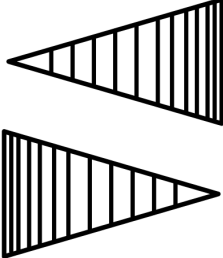
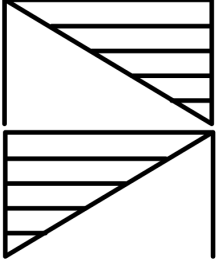
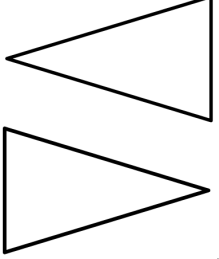
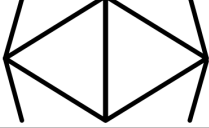
There were many occasions when it was ambiguous whether a certain sound fell within a certain function category or another. These were particularly prevalent when Wishart was playing between the motif sound which started as an *accelerando*, but changed into a dispersion as the individual sound events became fused together (the sound that occurs at 22'12" is but one example of this). Others might perceive these sounds to have a different function, but this is exactly what Wishart was intending by playing with the ideas of *gestalt*, contracting the motif to the point where they almost merge (Wishart 2012: 111).



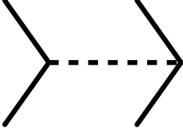

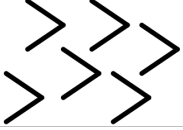


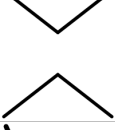



An element of the work that could not be described in great detail was the iterative sounds that occurred throughout. The *grille fonctionnelle* functions cannot account for the variety of potential rhythms that might take place within a work²²⁴, such as *Imago*. For example, the same function symbol (*reiteration*) is used for both the

²²⁴ Only the *reiteration* function exists to describe potential rhythmic or even arrhythmic repetitions.

gamelan rhythm and the long string of iterative notes that start at 16'22''.

Symbol	Name	Function description
	Introduction	A function that starts something new; always followed by a consequence (Roy 2003: 351).
	Conclusion	Solves a big unit of work without triggering new one (Roy 2003: 352).
	Suspension	A weak ending to a big unit or progression (Roy 2003: 352).
	Trigger	Introduces another unit abruptly and unexpectedly, causing one consequence (which can be silence) (Roy 2003: 351).
	Interruption	Suddenly stops something suddenly and unpredictably to make way for rhetorical ruptures, not necessarily a consequence but stops one musical line (Roy 2003: 351).
	Transition	At the edge of big units showing coherence to successive parts (Roy 2003: 353).
	Originator	Does not introduce new progressions and stays within a bigger unit, creating causality links at a local level (Roy 2003: 353).
	Figure	Morphologically unstable in the foreground over textured sounds that has no causal links and is polarising for other units (Roy 2003: 354).
	Emphasis	Subordinate to figure, same morphology but varying timbre (Roy 2003: 355).
	Foreground	A long prominent aspect within a work but subordinate to figure, which is generally unstable and energetic (Roy 2003: 355).

	Accompaniment	Less highlighted than foreground but matches energy profile (Roy 2003: 355).
	Tonic and complex polar axis	Long stable sounds that can have causal relationships (Roy 2003: 356).
	Movement	Long secondary temporal sound, which is unstable generating movement spectrally (not spatially) around a latent texture (Roy 2003: 356).
	Background	Stable and regular long sound that is lowest within the musical hierarchy (Roy 2003: 356).
	Accumulation and Dispersion	Unpredictable and unstable sounds that build or dissipate in energy (Roy 2003: 357).
	Accelerando and Rallentando	A progression built up from perceptual attacks that either speed up or slow down (Roy 2003: 357).
	Intensification and Attenuation	A spectral and melodic increase or decrease in energy (Roy 2003: 357).
	Spatial progression	A sound that moves spatially within the work (Roy 2003: 357).

	Question and Answer	A calling between two sound events (which do not need to share the same timbre or morphology) creating a self contained relationship (Roy 2003: 358).
	Announcement and Reminder	Sound events that share the same timbre (which are easy to remember), but separated over time (Roy 2003: 358).
	Anticipation	Prepares locally the intervention of another function (Roy 2003: 359).
	Reiteration	Iterative unit (not always predictable) made up of sounds that share the same timbre (Roy 2003: 361).
	Imitation	Identical sounds that are extremely close together (Roy 2003: 358).
	Articulation	Can be considered a micromontage that is not stable, interrupting a progression (Roy 2003: 362).
	Retention	Periods in a work that slow down units (can be silence) whilst maintaining its energy (Roy 2003: 363).
	Synchronous antagonism	Binary function between two conflicting musical expressions (Roy 2003: 360).
	Deflection	Interrupts a progression to present another development without any conclusion (Roy 2003: 361).
	Elipsis	A temporary interruption to a progression that is self contained (Roy 2003: 362).
	Indice	A sound that points to extrinsic elements literally or metaphorically (Roy 2003: 362).


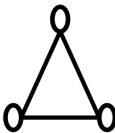
	Rupture	General function that breaks the tension suddenly (Roy 2003: 364).
	Spatial location	Variations in the internal space of a work that cause a rupture (Roy 2003: 363).

Table 7. Functions used within *Imago* analysis²²⁵ (appendix 5).

5.5.2.2 Larger structures and form within *Imago*

It is true that the entire composition is a gradual metamorphosis from one unit to another. I found it particularly hard to distinguish where one unit ended and another began. It was only through looking at the lower level event structures and the individual sound events (particularly the sonic markers) that I roughly mapped out what I interpreted to be the structures Wishart was alluding to (2012: 102). In the end I defined eleven larger structures, which included the two paragraphs already outlined by Wishart, through the application of Roy's *grille fonctionnelle* (see appendix 5 for the full analysis).

Within the first unit “the whole spectral metamorphosis agenda of the piece is set out” (Wishart 2012: 108), after which the work opens into a clear musical development. A few times there are sounds, in particular the gamelan sound, which interrupt the momentum of the work, suspending the apparent slow

²²⁵ The full list of functions can be seen in figure 7 in section 2.3.5.

metamorphosis²²⁶. The *fugu* sound specifically provides the best indication of the slow metamorphosis, as the peaks become richer in higher frequencies and as Wishart experiments with different transformations on the *fugu* sound's tail.

The first unit (paragraph one) contains the most space between sounds, creating a slow pace from the beginning. In these first few moments the original sonic entity is introduced and repeated twice to form a small *question* and *answer* rhetoric relationship, which is monophonic and particularly “unpromising” (Wishart 2012: 102). I personally felt that the silences were too long within this particular section and that the repetition of the same sound so many times was rather unnecessary²²⁷. Fortunately, when the piece starts to develop it moves rather quickly. It is interesting to remark that there aren't many silences within the rest of the piece. It is also in the first unit that the *fugu* and the birdsong sound are introduced briefly.

The second (2'35”) and third (5'21”) units are the most diverse in sonic material, dealing with iterative pulses, prolonged pitch notes and general cacophony. Both these sections are musically busy, having many musical lines that intercept and

²²⁶ However, these sudden changes also maintained my interest in the work within the listening flux, jolting me out of my passive listening state in the slower sections.

²²⁷ The slow transformation of material at the beginning was Wishart's attempt to ensure the listener would understand that the later complex sounds all originated from the original sonic entity and simple motif. However, this was not the case in my perception, which will be discussed in more detail in section 5.5.4.

create causal links with subsequent material. They both introduce a lot of different material that is later investigated in more detail when the work's momentum lessens. Unit 2 is made up of what I consider to be conflicting musical lines that take place at 3'53" and 4'34", marked by the *synchronous antagonism* function. This then builds to a crescendo that is interrupted by the abrupt introduction of the first gamelan rhythm (5'21"), which Wishart describes as a "clunky-gamelan-like sound" (2012: 109). The rest of this unit is filled with progressions that for me end weakly without any musical explanation (indicated with the uses of the *suspension* function), unlike the previous section where transitions between smaller progressions are smoother.

Unit 4 is signalled by another *fugu* sound at 7'03"; more pronounced than the original that was heard in unit 1 at 1'21". This is the first unit to deal with musical space, demonstrating the varying pace within the work. It is a welcome departure from the busier units that preceded it. Bell strikes occur throughout this section at 7'55", 8'28" and 8'58", signalling slight changes within the overall unit, but ultimately remaining within the same theme²²⁸. The unit concludes with many *dipper* sounds that move around the stereo image (which begins at 9'07").

Unit 5 commences with the first iteration of the *machine* sound (9'38"), a sound

²²⁸ This is indicated within appendix 5 with the use of the *originator* function symbol, which is always preceded by a *figure* within this section (the bell strike).

that is built up of many different rhythmic and rhythmical musical lines. This is then, like the emergence of unit 3, abruptly interrupted by the clunky gamelan rhythm at 10'11'', which soon dissipates to make way for a slower musical progression that is perpetuated by the bell strikes as in unit 4. However, unlike unit 4 the sounds within unit 5 are much harsher in texture and timbre (this mini section begins at 11'10'' and is signalled by a *fugu* sound). At 12'19'' the *fugu* sounds begin to reach their peak, forcing these harsh textures into a crescendo at 12'47''. Wishart then slowly transforms these textures into the larger mimetic section – *the fugu and the sea*. At this point the *fugu* sound rises becoming less prominent within the sonic hierarchy, until 14'12'' where the final (of this section) *fugu* sound's tail is transformed, signalling the end of unit 5.

Like unit 4, unit 6 is a diffuse section that is accentuated by small sparse and discrete pitched notes on top of a prolonged *complex polar axis*; originating in unit 5. Periodically the gamelan rhythm is introduced in bursts at 14'38'', 14'53'' and finally at 15'19''; masked underneath the other musical lines within the section. This eventually culminates in another reprisal of the *machine* at 15'50'', the longest and loudest of all the machine sections within the work, which is ultimately interrupted by another gong; indicating the start of unit 7.

Unit 7 is almost a direct mirror of unit 4, apart from the variation in timbre of the sonic material. Like unit 4 it contains many bell strikes that have only a minor

causal effect when compared to the bell strikes that can be found in unit 4. A final bell strike at 17'38" gestures the end of the section.

We now move abruptly once again to another busy section of the work at the beginning of unit 8. This small section of ferocious activity is soon interrupted by one of the loudest and most prominent bell strikes at 18'17". Shortly after the first iteration of the vocal sounds is introduced at 18'42", which Wishart refers to as *the oracle* (2012: 110). The oracle section slowly dissipates with a rising tone (19'45"), signalling the end of the unit.

The gamelan rhythm is introduced once again at 20'11" after the rising tone almost reaches a silence. Unlike the other iterations of the gamelan rhythm it is not abruptly introduced within the work. This is also the first time that the gamelan rhythm is not a parody of traditional gamelan music, following a typically rhythm as described in section 5.5.2. Although musically busy the individual musical lines are easily distinguishable. A mimetic cymbal crash creates an *ellipses* moment, re-enforcing the rhythmical nature of the unit. Wishart uses a *spatial location* rhetoric rupture to conclude the unit (21'43"), whilst providing a convincing transition into unit 10.

Within unit 10 the *machine* sound reappears at three specific points (21'55", 22'15" and 22'35"), spurred on by the *accelerando* motif with each iteration becoming less

prominent. Wishart marks on the score “machine dies” (2012: 172-173), indicating the slow decline of this particular mimetic sound. This is the last instance where the *machine* sound is heard within the work.

The final unit is introduced by a *dipper* sound at 22’46’’; one of the only occasions for me where it has a significant function within the work. Like units 2 and 3 it is sonically busy, including the final appearances of the *fugu* sound (23’15’’), birdsong (23’51’’) and the vocal utterances (24’10’’) before it leads to a final subtle crescendo (which starts roughly at 24’33’’).

5.5.2.3 Findings from applying the *grille fonctionnelle*

Looking at the visual analysis of *Imago* (appendix 5), after applying the *grille fonctionnelle*, one can surmise a few things beyond Wishart’s own writings. Firstly, the form of the work is separated into various units that increase in tension before release, either through an interrupting element or through a gradual transition into another section. Units 4 (7’13’’) and 7 (16’25’’) act as anchors within the work that, although subsidiary to the more impactful units, polarise the activity around them because of the stark contrast they evoke within the listening flux. These larger changes in momentum are generated by the functions on the local level, particularly with the use of *accelerandi*, *ritenuti* and the eventual accumulation of musical lines into one complex crescendo. However, these crescendos do not always materialise into a convincing musical conclusions for any of the units within

the work. If a unit is not interrupted by the emergence of a new unit then it dissipates in momentum earlier, creating a weak conclusion or a transition (the apparent lack of the *conclusion* function²²⁹ within the *grille fonctionnelle* transcription is evidence of this). One example of this can be found at the end of unit 2 at 4'30" where the momentum afforded to the musical lines begins to dissipate before it is interrupted by the first iteration of the gamelan rhythm at 5'21". Thus, the tension built up throughout the work is maintained until the end.

Another aspect I deduce from applying the *grille fonctionnelle* is the way Wishart manages to give life to a seemingly "unpromising" (Wishart 2012: 102) mono sound of less than 1/10th of a second duration. By applying musical concepts such as *accelerando* and *rallentando* he is effectively mimicking the "morphology that can be found in the physical world in the form of an elastic object" (Young 2004: 10), giving it real-world plausibility²³⁰. "Wishart has analysed a naturally occurring sound phenomenon and used this as a basic morphological pattern that helps to inform the evolution of the work at fundamental levels" (Young 2004: 13). The larger transformations, although considered as a slow metamorphosis in the form, demonstrate an evolution of plausible sonic materials over time; interrupted at various points to start a new compositional investigation (a new musical unit) into

²²⁹ Except at the end of the work.

²³⁰ Echoed not only by the sound-images that appear throughout the work, but also the morphology of many of the what?

fresh compositional possibilities of the original sonic entity and motif.

Wishart has successfully created discrete musical lines within the piece by employing different compositional techniques so that they are easily differentiated because of their positioning or spectromorphological qualities. This is most evident within the more hectic sections of the work where some of the more active units appear on the surface to be a general cacophony of sounds (usually complex in timbre). However, by adding certain sounds that are in opposition in terms of their spectromorphology Wishart is able to separate them within the work. 3'54" is one example where *accelerandi* and *ritenuti* are overlaid over a *prolonged tonic polar axis*, creating a *synchronous antagonism*. The musical lines are also communicated with the amplitude of sounds within the mix, particularly the sound-images which are masked at various points within the work before they are given a full section to develop²³¹.

Finally, what consolidates all these findings within the work (and what ultimately dictates its form) is the anticipation of upcoming materials and causal links evoked by the transformations of the sounds and through their local relationships. As previously stated Wishart introduces the mimetic sound-images throughout the work as sonic markers, creating a sense of anticipation for the listener. However,

²³¹ Elements that occur in the background of the work are indicated with the *background* function.

when one looks closely at the work one will notice that these are not the only sounds to be repeated. Most of the sounds that are heard in the work are repeated at least twice, usually undergoing some form of transformation with each iteration. Whereas the sonic markers operate on a structural level, each sound within a discrete unit goes through the same process of introduction, repetition and variation. The variations that occur can change the sound's function completely within the work. The first local example²³² of this occurs at 1'02" where an iterative pitched strike with a fast tempo is slowly changed from one frequency to a number of frequencies before returning to the original pitch, which is then spatialised and sped up almost to the point where it creates a single gestalt unit. This micro-process of introduction, repetition and variation drives the forward progression throughout the work.

5.5.3 Closing conclusions

Having access to the compositional notes of Wishart certainly impacted my perspective and investigation of his work. It was hard for me not to view the work differently when I could understand his intention, except when I did not agree with him for example concerning the importance of the *dipper* sound.

The connection that Wishart hopes to make between the original sound and the

²³² One that occurs within the same unit in a short space of time.

manipulated material is evident throughout the first paragraph. However, even in knowing the connection and the relevance of the compositional processes I still forget, within the listening flux, that all the sounds produced relate to the single sonic entity I heard at the beginning of the work²³³. This separation between the first initial sound and the transformed ones after is a testament to Wishart's craft as a composer. Nevertheless, the slow metamorphosis is clear and well understood.

²³³ Around phase 5 of the first paragraph (1'22'') I start to forget that the work is made only of one sound.

5.6 Chapter summary

What these analyses have demonstrated is that there are many ways in which one can feasibly undertake an analytical investigation. Each of the analyses had a different purpose, which fundamentally directed the methodology used and the eventual written and visual outcome. Thus, they followed and illustrated the process of analysis. It was also an opportunity to demonstrate how the identifiers within the electroacoustic toolbox could be used in order to construct an analytical discourse, by using them as an impartial lexicon.

There were a number of recurring aspects within all of the analyses. Common themes such as: looking glass interpretations, interruptions as a structural device and the satisfaction of having my understandings validated by matching my interpretations with the composer's intentions. Perhaps what these analyses reflect, more than the music itself, is my own understanding of the works through my subjective experiences.

To produce meaning it is necessary to have a conscious human being interacting with an environment. This human being, unless raised in a deprivation chamber, is going to be loaded with a myriad of subjective life experiences. Humans categorise 'good' and 'bad' experiences based on their interactions with the environment and their ability to detect, memorise and compare an exponentially growing repertoire of new good and bad things. Most human intentions are based on these subjective experiences (Milicevic 1998: 27).

The experiences of these works were not the only aspect that affected my perspectives. It was also the combination of all my life experiences and formed

understandings of musical practice and tuition. Other analysts would undoubtedly have varying interpretations even when they applied the same methodology as I.

Any analysis implies a projection of the self, which, like the world, is essentially discontinuous: thus as real-time perception has been empirically shown to be an illusion, its apparent continuity is nothing other than a “limit” illusion built upon the vacuum in the spaces created by the successive agglomerations of perceptual discontinuities. Centred upon morphological aspects, the analysis of the parts of a phenomenon may be not without interest, not because of what it has to say about the totality of the analysis, but rather because it may convey something of the functional characteristics of the discontinuity of that which – or of the person who – is doing the analysis (Berenguer 1996: 216).

6.0 The Online Repository for Electroacoustic Music Analysis (OREMA) project

6.1 The analytical community concept

An analytical community is a collection of practitioners and specialists that work together towards the advancement of music analysis, in this case of electroacoustic music. The format of such collaborations tends to encourage sharing of materials and knowledge; hence, this chapter argues that open access and community collaboration is essential for such endeavours. The OREMA (Online Repository for Electroacoustic Music Analysis) project²³⁴ will be used as an example of such an initiative; one that aims to provide an open access knowledge repository and a platform that will facilitate a discourse between creators of original content and its audience.

6.1.1 Conception

Initially the conception of the OREMA project was formed from a simple idea (based on the concept of the imperfect analysis²³⁵): could a platform be created to allow analysts the ability to share their ideas, concepts and indeed analyses freely

²³⁴ www.orema.dmu.ac.uk

²³⁵ As outlined in section 3.5.

and quickly amongst other practitioners? Such a platform would allow for many different perspectives on the same work, not to create a consensus, but to demonstrate how the same work might be interpreted and analysed to gain a universal understanding of its artistry and impact. As Nattiez (1990: 168) said there is “never only one valid musical analysis of any given work”. However, in pursuing this initial concept it soon became evident that there were indeed other benefits in creating a community platform, especially within the electroacoustic community. This was an opportunity to rethink the current academic landscape, moving towards a collaborative initiative to harness the untapped potential of this community. The platform would need to connect with the current electroacoustic community – one which is geographically spread throughout the world – in a meaningful way, beyond the current possibilities allowed through mass emails and annual conferences/symposiums. It would have to allow for true collaboration, where there was no hierarchy or an enforcement of only a few ideas, rather a clear focus and aim that any work undertaken would be towards the advancement of the analysis of electroacoustic music. The most obvious platform for such an initiative would be the web 2.0 technologies, in particular wikis, which have been used by other communities, usually those that work and share results under Creative Commons licences. These websites provide a platform for practitioners to share and discuss the contributions of others and to increase the knowledge base of the community and its readers: so why not the electroacoustic community?

6.1.2 Key concepts of the analytical community

Web 2.0 technologies allow for a multitude of different activities beyond their web 1.0 counterparts. “Web 2.0 enables and facilitates the active participation of each user. Web 2.0 applications and services allow publishing and storing of textual information, by individuals (blogs) and collectively (wikis), of audio recordings (podcasts), of video material (vidcasts), of pictures, etc.” (Ullrich et al. 2008: 706). In particular wikis “can be used as a source for obtaining information and knowledge, and also as a method of virtual collaboration, e.g., to share dialogue and information among participants in group projects, or to allow learners to engage in learning with each other, using wikis as a collaborative environment to construct their knowledge or to be part of a virtual community of practice” (Boulos, Maramba and Wheeler 2006). An analytical community could be developed alongside a wiki-based platform devised for the sharing of analyses and ideas. In doing so the participants would be able to communicate and have germane discussions regarding seminal issues surrounding electroacoustic music analysis already discussed throughout this thesis.

The concept of an analytical community can be split into five main areas: communication/participation, collaboration/adaptation, publication/contribution, audience/pedagogy and the need for an analytical community²³⁶. Of course these

²³⁶ The groupings of some of these areas will be made clear in the succeeding sections.

concepts do not function discretely, crossing over and ultimately impacting on one another. However, each of these concepts has a prime priority, which will now be discussed.

6.1.2.1 Communication/participation

The process of analysis that was presented in section 3.1 (*to question – to investigate – to form coherence*) is an intrinsic process to analysis, only concerning the analyst(s) (author(s)) involved. However, this is not the end of the analytical process. This process is a one-way trajectory towards communicating an understanding of a work to a reader, but it does not include a potential feedback process in which the readers are able to form a dialogue with the analyst. If an analysis is a form of communication, a perspective on a particular work, then it would seem suitable to have that communication be two-way, allowing for a retort from the potential recipient. Thus another feedback process emerges where the reader is able to communicate their responses to the perspective of the author and potentially participate in a larger discussion around the analysis in question (Figure 25 demonstrates this interaction).

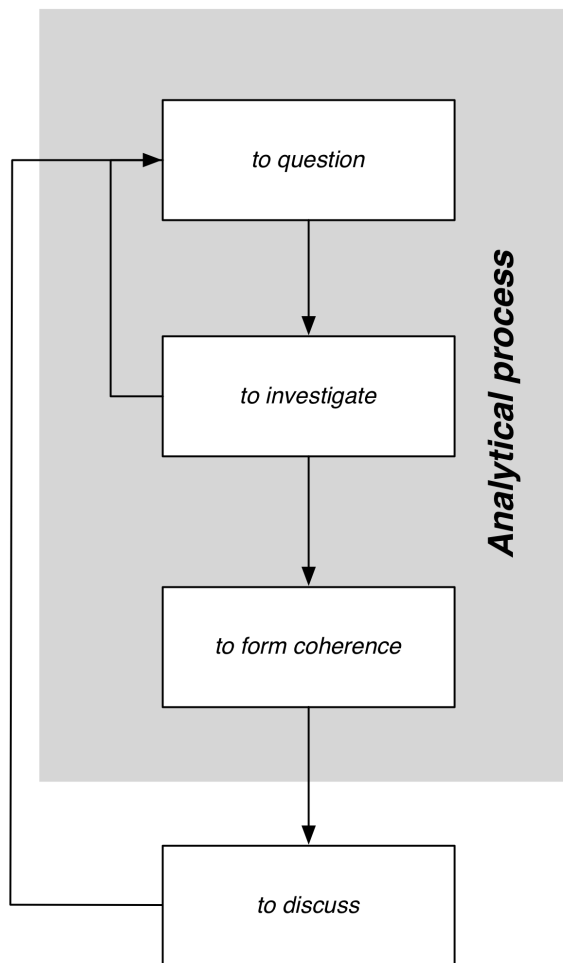


Figure 25. The second feedback process from discussions with readers

With the advent of web 2.0 technologies the communication and participation detailed above are entirely possible. As apposed to traditional informative 1.0 webpages that only provide information web 2.0 websites allow for users to participate with the content being made available. This can be in the form of comment boxes, or the ability to rate the content in question. This creates what Ullrich (et al. 2008: 706) was referring to as “active participation” where the end user is not only a reader of content, but can actively interact with it and potentially

form a discourse with the original author (in web terms the 'content creator'). This contact is not limited to a single occasion (provided the parties involved maintain contact) and have no preordained deadline, allowing for discussion to take place over hours, days, weeks, months and feasibly years. The outcome of such an ardent discussion might not only be for the benefit of the analyst, who may refine and amend aspects of the original analysis; but also for the readers who might be inspired to create their own analyses or tools; and for the greater community that will have gained different perspectives on the understanding originally submitted (potentially both positive and negative).

Participation, however, is not always constructive and can become damaging to a community if not monitored and controlled. Malicious users, also referred to as 'internet trolls', operate on the community level in areas where content creators and participants interact and collaborate, causing havoc by either being generally unfriendly and unhelpful within discussions, potentially sabotaging an in-depth conversation, or by posting inappropriate content to the site to put the communities governance under question (Shachaf and Hara 2010: 364). One way to increase a person's willingness to comply with the norms of a community is to prevent anonymous participation (Kiesler et al. 2011: 155), ensuring that all users have to create a login to contribute to the website. However, greater authority is needed in cases where repeat offenders create multiple accounts to attack the wellbeing of the website and its participants. Unfortunately, if someone wants to cause

problems within an online community there is very little administrators can do beyond completely banning the individual(s) involved.

6.1.2.2 Collaboration/adaptation

Collaboration is an important part of web activity. The technology allows for people from any geographical location to work together towards a combined goal. Wikis are one specific type of platform that allow for multiple users to create, amend and moderate content (others will be discussed below as well). Usually these communities have codes of conduct that are enforced by administrators of the site. Wikipedia's *Five Pillars*²³⁷ are but one example of a set of guidelines for participants, so that they work towards a common goal and rule. The point of a wiki is to allow for a form of consensus, but not a fixed consensus, rather one that changes and evolves as attitudes towards a subject change. Other platforms, such as Content Management Systems (CMS), provide the ability to collaborate, but not as freely as one might be able to within a Wiki. The differences between these two platforms is that CMS structures usually are much more limited regarding the input and controlled through access rights and the types of content certain parts of a website might accept. They also provide more user-friendly interfaces where participants only have to add information into the correct field and the formatting is then handled by the platform. Conversely, Wikis provide the most freedom,

²³⁷ http://en.wikipedia.org/wiki/Wikipedia:Five_pillars

allowing all users the same abilities to edit public pages including formatting and, sometimes, full HTML capabilities. The disadvantage is that the end user might need to know a lot more about the structuring and formatting of the website before they are able to make any meaningful contribution.

The other side of the coin is a community that allows its users to adapt previous original content contributions. This could be viewed as an unwilling collaboration, as the original author might be unaware of the use of his or her content, which ultimately shapes the result by providing the grounding for which the adapted content was based. Hutcheon (2012: 8) defines adaption as:

- "• An acknowledged transposition of a recognisable other work or work;
- A creative and an interpretive act of appropriation/salvaging;
- An extended intertextual engagement with the adapted work."

Original content is usually protected under a Creative Commons Licence, allowing for others to adapt and change the work, provided that they attribute the original author and that the adaptation is not for commercial use²³⁸.

Both collaboration and adaption follow the philosophy of the "wisdom of the crowds" as outlined by Surowiecki in his book titled *The Wisdom of the Crowds* (2004). In it he argues, whilst providing examples, that groups of people are better

²³⁸ There are a multitude of different licences for online content that can be arranged through the Creative Commons Website: <https://creativecommons.org/>

at solving problems and coming up with answers than individual specialists²³⁹. Surowiecki (2004: xix) states “diversity and independence are important because the best collective decisions are the product of disagreement and contest, not consensus or compromise”. However, with the collaboration and adaptation some coordination is needed, potentially from moderators, to ensure the focus of the group remains the same. “Collaboration works because, when it works well, it guarantees a diversity of perspectives” (Surowiecki 2004: 162). By providing differences of opinion a website can avoid potential negative implications of collaboration, such as groupthink where diversity is lost because of other dominant personalities enforcing their opinions on others as the only truth on a subject. As Surowiecki (2004: 36) states “it is easier to work in groups with other likeminded individuals (also known as cohesive groups) than it is within groups where there are differences of opinions. In cohesive groups decisions can be made because the assumption is that they are right, as there is no one to question their choices”.

6.1.2.3 Publication/contribution

Publication and contribution within a web 2.0 environment refer to an original contributor; someone who produces authentic content to a website. In the current research environment authors only have a number of means to publish their

²³⁹ Surowiecki (2004: 161) provides the example of scientists who collaborate because as science becomes more specialised and more subfields proliferate, it is difficult for a single person to know everything he needs to know.

articles or analyses: published within or as a book, published within an academic journal, or self-published. The current academic publication system does not encourage collaboration and limits access to end-users²⁴⁰. As researchers we are encouraged to publish our findings within peer-reviewed journals, specifically ones that are considered to be high-impact. This is less prevalent within arts and humanities, but there is still a sense that one must publish within a peer-reviewed journal/book in order to advance an academic career²⁴¹. “Scholars are still too focused on themselves and insufficiently attentive to the ways in which others value and define community” (Renninger and Shumar 2002: 372). This generates an underlying competitiveness in intellectual property; meaning people are less likely to share their information unless there is a perceived personal gain. Conversely, potential impact has been put under question by a number of studies between those articles that are freely available through open access initiatives and those that are not. Antelman’s (2004: 379) study into the impact of open access journals found that, across a variety of disciplines, open access articles have a greater research impact than articles that are not freely available²⁴².

The analytical community concept bypasses the peer-review process and allows users to share their work freely and openly, promoting discussion and

²⁴⁰ This will be discussed in more depth in section 6.1.2.4.

²⁴¹ The phrase ‘publish or perish’ is often used to describe this ideology.

²⁴² This particular study was only limited to mathematics, electrical and electronic engineering, political science, and philosophy research fields (Antelman 2004: 374), but the principles of the study would be applicable to other fields as well.

collaboration. Since there is no peer-review the quality of the content could be considered questionable. Xiao and Askin (2012: 366) state that the wiki model is "less reliable and accurate because the open editing policy and the anonymity of the contributors potentially make it challenging to have a cohesive article with consistent perspective and identifiable sources". In well-balanced online communities it is the active users who become surrogate peer-reviews; ensuring that content is factual and relevant to the scope of the website. As outlined in section 6.1.3.1 the readers can form a dialogue with the content creators, or, if they have the option, alter the content as they see fit, depending if there are any restrictions on the particular information in question.

Although the quality of the content might not be to the same standard as peer-reviewed articles there are a number of advantages in a community that adopts a wiki approach. The first and main advantage is the speed in which information is published and made publicly available. Tapscott and Williams (2006: 152) note that the current peer-review system (specifically within the science domain) "cannot keep up with the amount and speed of research currently taking place", meaning that research can often be out dated soon after it is published. Such quick publication means that the content is often innovative and new. The downside to this is that some content might not be up to the standard of those that have gone through a rigorous review process. However, for what a wiki model might lack in validity the next advantage negates to a certain extent.

The second advantage of such publication is that it is constantly evolving. There is no publication date per se within wiki models, meaning that all documents are always in a state of flux. At anytime a user might decide to make small changes in grammar to tidy the article, or make larger scale changes that might completely change the focus entirely. This lack of fixity allows for information to evolve as time passes, rather than letting it stagnate and become out of date. A by-product of this type of publication is that all the changes are then tracked and recorded, allowing users to see the major and minor changes over time and indeed who made the amendments. This means that these wikis effectively function as repositories, providing access to "versions of papers either before they are submitted for publication in a journal or at some point after they have been published" (Finch 2012: 6).

The final, perhaps most unique aspect of wiki and even open access publication is that it is free. Although perhaps very obvious for many as true collaboration needs to be open, it is also the strongest asset to a wiki and its audience. This will be discussed in more detail below.

6.1.2.4 Audience/pedagogy

OREMA's conception was an attempt to answer what seemed at the beginning to be the fundamental issue with the current academic system surrounding

electroacoustic music. The fundamental issue one is referring to is that knowledge pertaining to the creation and understanding of electroacoustic music has an associated cost. Expert knowledge relating to electroacoustic music is often limited to those who already currently work or study within an institute that subscribes to the many journal sources, or to those who are willing to pay for either a personal subscription or individually for each article to gain access to scholarly texts (a single journal article can cost in the region of £15 - £25). What this creates is a barrier of entry for anyone who might be interested in understanding more about the music, particularly those who work outside the realms of academic research. The accessibility of electroacoustic music has been under discussion and highlighted by initiatives such as the *Intention/Reception project* (Landy 2006; Weale 2005). The barriers of entry to appreciating electroacoustic music are not just knowledge of the music, but access to this knowledge, which at the moment are held under lock and key. If we want electroacoustic music to reach a wider audience then avenues to learning about the subject need to be open and accessible to all.

The traditional model of education would position its staff as experts, literally professing their knowledge and thereby imparting it to students. "Such experts are engaged in a process of collecting, synthesising, and pre-digesting available knowledge into lectures, textbooks, and other resources much as do their counterparts in the journalistic or encyclopaedic industries [where] students are

positioned as receivers of that knowledge and are required to work through a number of predetermined samples in order to demonstrate their ability to recall and apply the knowledge gained” (Bruns 2008: 345). Rather than sticking to the old teacher-student model one could potential adopt a community model, as outlined above, in which participants share information and ideas and, most importantly, collaborate. The move from experts-novice paradigm to a peer-to-peer model requires very different expectations and certainly does not replace the current status quo. Many within the electroacoustic field are accustomed to the monastic academic system (if one could refer to it as that) where there exist different institutes that are spread internationally across the world.

The most interesting contribution-oriented activities are those that are combinations of discovering and creating, comparing and discussing, and building on other learners’ products. The value of the contribution-oriented pedagogy lies in the creation or finding and selection of existing resources, their combination, structuring, and argumentation why a selection was made, as well as the reflection upon the thinking processes behind this (Collis and Moonen 2006: 65).

By adopting a wiki as a means of pedagogy groups are embracing a constructivist approach to learning. “Constructivism is based on the premise that knowledge cannot be transmitted but has to be constructed by the individual. Therefore, learning is an active process of integrating information with pre-existing knowledge” (Ullrich et al. 2008: 706). A symbiosis is created where people work together for the greater good of the community, building on existing knowledge and teaching newcomers; many of whom will have their own expertise and perspectives that they can share with the community.

6.1.2.5 The need for an analytical community

Many might question the need of such a community and argue that one already exists based on the research so far developed. To some extent this is true; however, it is the contention of this discussion that the current landscape of academia hinders the development of the knowledge base of electroacoustic music analysis. There are a number of factors preventing the advancement of electroacoustic music analysis, which will be outlined now:

- I. *The change of the object of study* – The question of what one actually analyses has already been discussed at great length within this thesis (section 3.3) and is another potential problem, specifically for cross-media forms of electroacoustic music. A community could investigate different approaches independently, ultimately sharing the results to evoke a grander discussion as to how to confront these domain specific issues.
- II. *Language associated with electroacoustic music* – As stated in section 2.1.2 the terminology surrounding electroacoustic music (not just the analysis of it) is still contested. An analytical community would not aim at forming a consensus; rather demonstrate the different understandings and interpretations through group discussion.
- III. *Lack of interest in musicology* – In 1999 Landy (1999: 68) wrote “there still seems to be relatively too little musical analysis of note within the electroacoustic field and, in my view, too few discussions concerning which

techniques are appropriate for the analysis of sonic works including those of the popular sorts". It is arguable whether this has changed a great deal since then, as there have been only a few publications that have contributed to the advancement of electroacoustic music analysis.

IV. *The language barrier* – One of the disadvantages of having an internationally diverse community is that many of the most important texts concerning electroacoustic music analysis only exist in languages other than English. Work has been done to translate Schaeffer's work with a select few scholars assuming this responsibility²⁴³, yet there is still no translation of Schaeffer's opus *Traité des Objets Musicaux* (1966). Many English-speaking scholars are isolated from these very important texts and have to depend on English-speaking scholars' summaries to rectify the gaps. This issue of language of course works both ways as many texts written in English create barriers for those who do not speak the language.

V. *Grey literature* – Since the electroacoustic world is internationally diverse there are a number of instances, particularly for older literature from other countries, where books and articles are no longer accessible through standard means, or, potentially, not accessible at all. These issues only accentuate the language barrier, particularly if the particular reader has to

²⁴³ John Dack and Christine North have made a translation of Chion's book *Guide des Objets Sonores* (2009), which can be found on the EARS website (www.ears.dmu.ac.uk). They have been contracted to translate the *Traité* but as yet there is no firm publication date.

travel in order to have access to the material. Web-based articles somewhat alleviate this issue, but then again there are the potential cost implications.

Until these issues are addressed in a meaningful way they will continue to hinder the innovation and advancement of electroacoustic music analysis. The concept of the analytical community is intended to address all these issues, whilst providing potential advantages to the domain. There are two benefits one can foresee from having an analytical community that would address many of the barriers listed above: open access and wisdom of the crowds.

6.1.3 The structure of online communities

The metaphor of a garden is often used to describe the different roles users take in open online communities such as wikis. Four major (positive)²⁴⁴ online community personalities are discussed below²⁴⁵; many of which have been expanded upon from Mason and Thomas (2008):

- *The planter* – These users are the ones who populate sites with original content, which then act as a basis for further edits. This is arguably the biggest contribution one user can make for an online community.
- *The gardener* – The second biggest contributor to online communities.

²⁴⁴ As previously discussed there are a number of negative roles users could take within the community, such as the 'Internet troll'.

²⁴⁵ It should be mentioned that one user can take on the personality of all the roles listed below at anytime within a wiki and often switch depending on how the content changes over time.

These users make major edits to existing content (potentially changing the focus and intention completely); cultivating the online landscape by ensuring it is up-to-date and relevant. They also protect content from potential vandals, ensuring it remains relevant to the topic.

- *The gnome* – Gnomes make smaller corrections to content, such as grammar and factual information, correcting things quietly in the background (Mason and Thomas 2008: 13).
- *The lurker* – The final user of a wiki is the passive user, who only views content, not contributing in any way whatsoever. In the garden metaphor these are the neighbours who come over to the garden, but do not contribute to the upkeep.

There is inequality however in the ratios between contributions of the aforementioned users. The 90-9-1 ratio of contribution is widely known in the Internet community²⁴⁶. This ratio dictates that for every 1% original/heavy contributor (this could include very active gardeners) there will be 9% of users who will make minor amendments, whilst the remaining 90% of users will be lurkers who will only read and not contribute to the community. Figure 26 gives a representation of this inequality.

²⁴⁶ Arthur (2006) and Nielsen (2006) detail examples of this phenomenon.

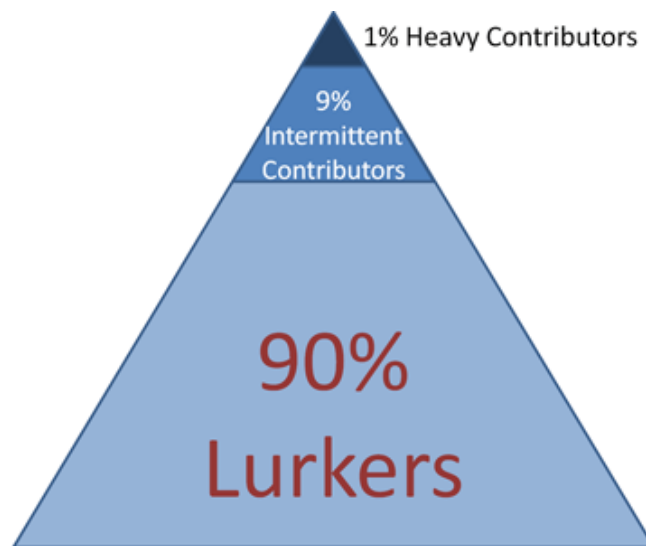


Figure 26. The 90-10-1 ratio as depicted in a triangle taken from Nielsen (2006).

“Earlier metrics garnered from community sites suggested that about 80% of content was produced by 20% of the users, but the growing number of data points is creating a clearer picture of how Web 2.0 groups need to think. For instance, a site that demands too much interaction and content generation from users will see nine out of 10 people just pass by” (Arthur 2006). Although this inequality can be damaging to a community website, particularly those which want to demonstrate a variety of different opinions and perspectives and not just from a select few, it should be mentioned that this is not the major concern with online community websites. So long as there is activity, not just contributions but also people viewing and using the content, then the website will still be of some use. Lurkers, although passive users, are still using the website, finding interest in the content which could potentially lead to some contribution in the future, provided that this initial interest is maintained and that they feel the community is worthwhile.

Gaining and indeed maintaining interest within a website is one of the most challenging aspects of an online community. People need to feel that their commitment to an online community is worthwhile. Ren (2011) defines two distinct reasons for commitment within online communities: *normative* and *need-based*. *Normative commitment* refers to the one's feeling of "obligations to the community to be loyal and act on its behalf", ultimately splitting into three reasons: commitment to the cause, others' normative commitment, and reciprocity (Ren 2011: 102). *Needs-based commitment* refers to ones "attachment to an online community that depends on the net benefits people's experience from the community" (Ren 2011: 105).

When net benefits are positive, members predict that they get sufficient rewards to warrant the time, effort, and frustration they spend on the community. When benefits are low and the costs of leaving the community are low, commitment will also be low (Ren 2011: 105).

By creating an environment that has sufficient interest, reciprocal advantages and net benefits, an online community will thrive. How one achieves this is often hard to explain as the Internet has been home to many bizarre phenomena. However, certain aspects will help in the success of an online community, such as good content, activity and goals.

6.1.4 Examples of collaboration - how can it work?

The most obvious example of a collaborative community in action; the fifth most

popular website in the world²⁴⁷ – Wikipedia (Wikimedia UK 2012: 4). It is an encyclopaedia based on a wiki model where the majority of articles are added and moderated by users, termed by the community as *Wikipedians*. Wikipedia is a great example of where the community becomes the peer reviewers of new and existing content. Figure 27 below outlines the process for one article.

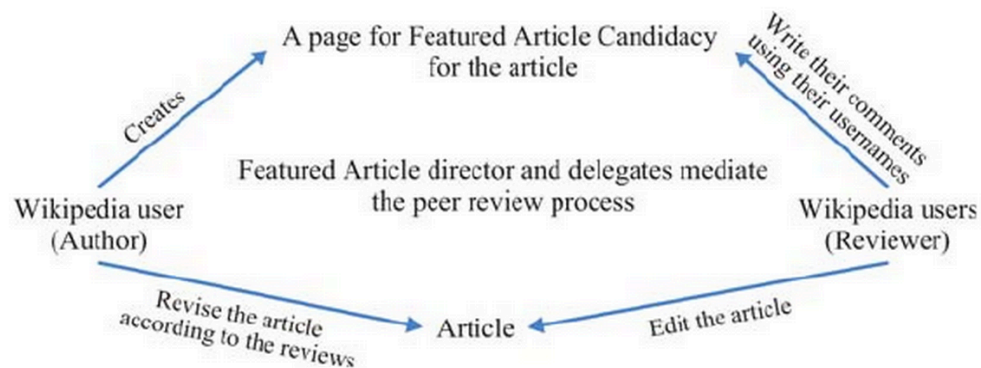


Figure 27. The peer review process in the Wikipedia model taken from Xiao and Askin (2012: 363).

"Wikipedia encourages community introspection: that is, it is strongly designed so that members watch each other, talk about each other's contributions, and directly address the fact that they must reach consensus" (Viégas, Wattenberg and Dave 2004: 581). When one questions the validity of the content produced by this community it is interesting to note that the majority of participants that contribute to articles on Wikipedia are approximately aged 25 years old and over fifty percent of contributors have studied at undergraduate level or higher (Glott et al. 2010: 7).

²⁴⁷ It is important to mention that it is the most visited non-profit site and a great example of an open access initiative that utilises wisdom of the crowds philosophy.

There are many examples of collaboration within a creative field. One such example occurred in the *A Million Penguins* research project (Mason and Thomas 2008), where participants worked together with complete strangers to create a novel. Many of the positive and negative aspects of anonymous collaboration were documented throughout this project, particularly with the users who wanted to cause harm to the community and the novel. However, what the project did demonstrate was how many different people could be committed to a common goal, one that had no monetary value for the individuals involved. “Anyone who has engaged with online communities in the last two decades will recognise the tensions involved in keeping interest levels high enough to encourage participation without the community becoming so active that there is no hope of maintaining control” (Mason and Thomas 2008: 20).

6.1.5 The electroacoustic community – a ‘wise crowd’?

The concept of the analytical community might work well in theory, but the electroacoustic community might not be the right type of participants to adopt a ‘wisdom of the crowds’ mentality. Surowiecki’s (2004: 10) defines four conditions need to satisfy what he terms a ‘wise crowd’, some of which have already been discussed elsewhere within this subchapter. The four conditions being: diversity of opinion, independence, decentralisation and aggregation.

[...] Diversity of opinion (person should have some private information, even if it's just an eccentric interpretation of known facts), independence (people's opinions are not determined by the opinions of those around them), decentralisation (people are able to specialise and draw on local knowledge), and aggregation (some mechanism exists for turning private judgments into a collective decision).

It is clear that within the electroacoustic community there exists a wide spectrum of opinions, satisfying the first of the four conditions. Because of its international presence the community is often diverse, however it could be argued that there are a number of small sub-communities within the research centres and universities that will likely share similar opinions and prevent independence to some extent. There is no clear governing body for the wider electroacoustic community, only those that exist within the various institutes within the pocket sub-communities, meaning that it is decentralised, allowing for different specialisms to grow. Arguably the one missing factor in ensuring the electroacoustic community is a wise crowd would be the final condition, aggregation. To achieve aggregation Surowiecki (2004: 74) states that a balance between two imperatives is needed: making individual knowledge globally and collectively useful while still allowing it to remain resolutely specific and local. A community website could satisfy this requirement.

6.2 The project

The OREMA project is a community-based repository and forum for electroacoustic music analysis. It is a platform where analysts can upload and share their analyses of electroacoustic compositions and participate in online discussions of analytical methodologies and strategies with other practitioners. Furthermore, as the name suggests it acts as an archive and repository for articles and analysis not housed on the website.

The OREMA project was the realisation and manifestation of an analytical community outlined in the previous subchapter. By making it open in both accessing and editing the content the project puts the hands of knowledge in the hands of the public and not the experts; sharing the knowledge with one another through peer-to-peer relationships rather than the expert-student paradigm. The concept of any community is a selection of people who share similar interests. In the case of the OREMA project that interest is in the analysis of electroacoustic music. The aim of the OREMA project was to provide an open access platform for collaboration. It acted as a repository for user-generated content, which includes analyses of electroacoustic works (which ranged from acousmatic music to even an analysis of an audio-only game (Hugill 2012b)), descriptions of analytical tools (which function similarly to Wikipedia articles allowing any participant to edit and contribute) and a forum.

The OREMA project was not intended to be a social experiment, but rather to test if there was a precedent for a community that would specifically focus on electroacoustic music analysis. Therefore, the outcomes that will be discussed in later subchapters will focus on the contributions to the project, rather than the potential impact it has had, as this, to some extent, is hard to know.

6.2.1 Ethos, aims and application

The original aims of the OREMA project, formed in 2011, were to assess whether a community-based forum and repository, alongside a clear taxonomy for music analysis, would provide people from different backgrounds a means to understanding electroacoustic music. These initial aims can be broken down into three:

- To create and maintain a community-based forum and repository for electroacoustic music analysis;
- To assemble a taxonomy of terms;
- To create a toolbox of analytical methodologies.

The objectives of the OREMA project were less apparent as they were concerned with how to maintain interest in the site, which should have precipitated the aims of the project. The objectives were:

- To encourage activity from members so that there is an active and engaged community;

- Ensure sufficient added-value for users;
- Maintain and improve quality of use for participants.

As time progressed and the project began to change, the aims of the project also shifted. For example, one of the main aims of the initial stages of the project, not listed above, was to assess the suitability of the platform it should operate on. This could only be decided after the initial launch of the website and once feedback had been received from the users. Moreover, certain aims initially conceived at the launch were soon deemed either irrelevant as the project progressed, or unattainable. The assembling of a taxonomy of terms was one example of this, as people were too afraid to have an opinion outside the presupposed academic norm²⁴⁸. The final aims of the project, after the launch and the initial stages of collaboration, can be summarised thusly:

- To create and maintain a community-based forum and repository for electroacoustic music analysis;
- To share and distribute open access content including, but not limited to: analyses, articles (discussing analytical tools) and forum discussions;
- To allow the author(s) of an analysis the ability to refine their submissions after publication;
- To assemble a toolbox of analytical methodologies, which are: authored, edited and moderated by the community; allowing for the evolution of

²⁴⁸ This will be discussed in more depth within section 6.4.5.6.

understandings and ideas as time passes.

The objectives still remained the same from the beginning of the project as these were concerned entirely with the administration of the website.

6.2.2 A model for community engagement

Some rules were defined at the beginning of the project to provide focus and a community understanding of its intended scope. Five credos were formed (similar to Wikipedia's *Five Pillars* outlined in section 6.1.2.2) as a framework for publication and collaboration. They are as follows:

- The OREMA project will analyse electroacoustic music in all its guises (acousmatic, sound art, installations, electronica etc.);
- There is no one "true" analysis. The OREMA project encourages the analyst to post analyses of the same composition to show different perspectives;
- There is no one methodology or strategy for analysis. The analytical toolbox is there for reference and is not a list of the acceptable tools for analysis within the project. Users are allowed to apply their own devised strategies to analyse electroacoustic works;
- There is no hierarchy within the OREMA project. All members, regardless of their occupation and status, are equal and share the same rights;
- All information held on the site is free to access and free for people to reference under the protection of a Creative Commons licence.

These rules never needed to be enforced in any significant way throughout the

project, but acted as a means to direct attention to new users and readers who were interested in how the project worked.

6.2.3 Copyright

The copyright of material was of particular concern within the project. It not only allowed for the sharing of ideas and content through the use of a Creative Commons Licence, but also limited the ability of the users in gaining access to the music and theories that existed outside the project. The music files of the works being analysed by the community could not be provided to the users, since uploading any of the works would have been in direct violation of the author's and publisher's rights. There was no meaningful way of addressing the issue of access beyond the project other than to correctly reference the sources of the work in question. This inevitably prevented a number of potential contributors from adding to the site.

Participants were encouraged, where possible; to include the creation files such as an Acousmographie or EAnalysis files, to name just two examples. This meant, provided the user had a copy of the original work, that they could use these files as a basis to create their own analysis of the piece.

6.2.4 The platform

The initial manifestation of the OREMA project was implemented using a wiki

architecture with the open source MediaWiki as a platform. Later it was deemed appropriate to change the platform to Drupal, a CMS architecture. Of course with both of these platforms the aims were the same; to present "a web-based system with appropriate upload, collaborative, and communication functionalities providing the common medium into which contributions are placed, for further sharing as well as for feedback and assessment" (Collis and Moonen 2006: 61).

The information held on the website is split into three distinct content types: analyses, analytical tools and comments/discussion threads. Although these areas are interrelated they function in slightly different ways. First, the analysis section of the website is a place where users can submit their analyses of any electroacoustic work. This can include a written description with embedded images and uploaded files. Only the authors and moderators (for administration related issues) can delete or modify an analysis once it has been uploaded, meaning that an author can make changes to an analysis once it has been published on the site²⁴⁹. Second, the analytical toolbox is a collection of methodologies and strategies for electroacoustic music analysis. These articles act as short and concise descriptions of analytical tools and methodologies, usually described using the following three headings: *what is the tool?*, *the framework of the tool* and *how can it be used?*. These pages were intended to function similarly to Wikipedia articles in

²⁴⁹ This was not initially the case when the site was based on a MediaWiki platform, as any user could make amendments to any content held on the website.

that any user can alter the content if they consider the information to be inaccurate or false. This framework ensures that an evolving consensus is gained through peer review and collaboration, as outlined in the previous subchapter. Finally, there were areas for discussion throughout the site allowing users the option to comment on analyses and analytical tools within the comments section at the bottom of every page. There was also a forum where users could post topics to debate ideas relating to electroacoustic music analysis. All the content on the website is user generated and protected under a Creative Commons licence that allows other users and non-users the option to share and alter content, provided that credit is given to the author(s) and that it is used for non-commercial purposes. This means that users and non-users can use other analyses as a template to construct their own analysis.

6.2.5 Overview of the website

To better explain how OREMA works an overview is provided (Figure 28). It documents the process of how a user (or indeed users) contributes to the website and how the wider community interact with the content.

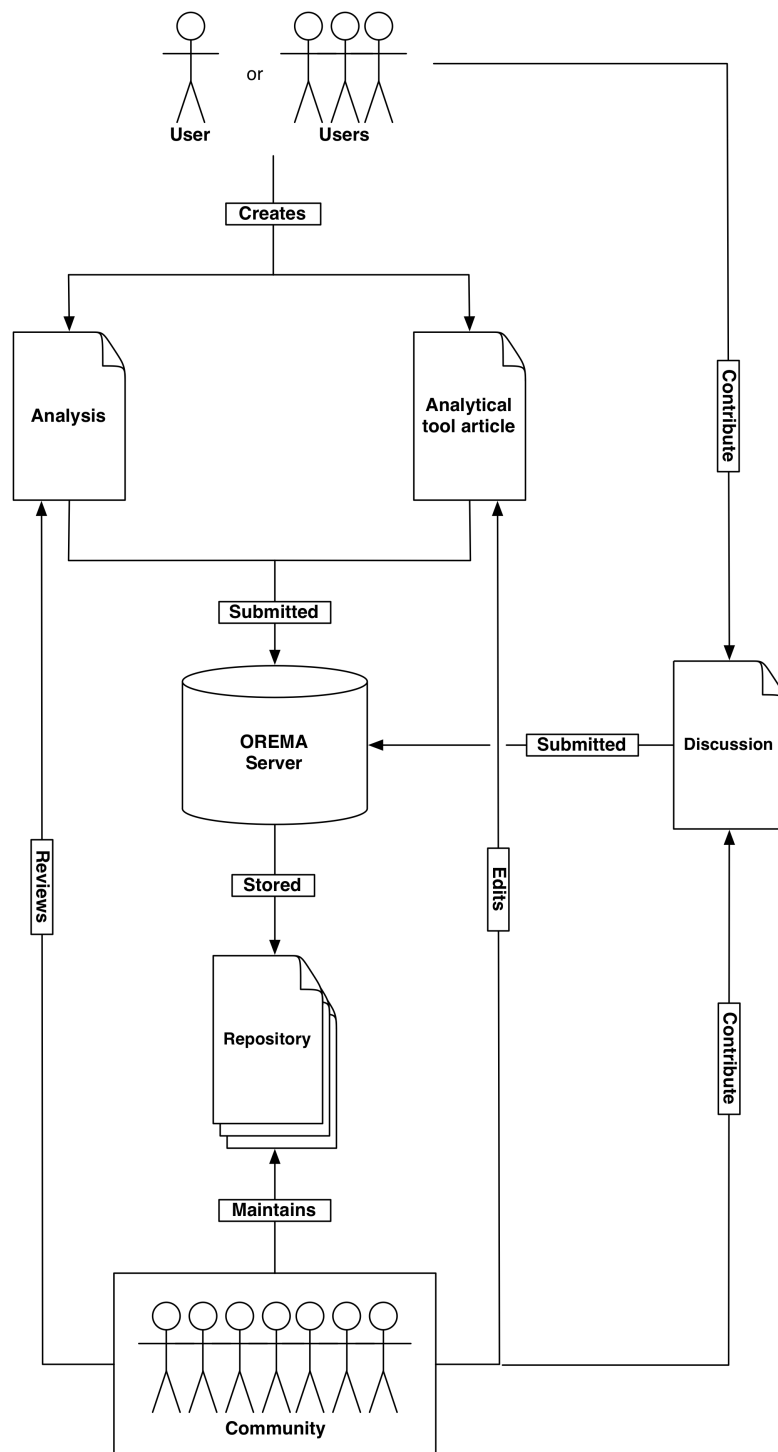


Figure 28. Overview of the OREMA project.

6.3 History of the OREMA project

The OREMA project has been live for over 3 years including the beta launch and the subsequent publications through the eOREMA journal. To better understand the potential impact it has had it would be useful to chronologically retrace the major changes over time and discuss how these changed both the website and the community.

6.3.1 Before the big bang – the background work before the launch

Before any website was created emails were sent out to universities and institutes from around the United Kingdom to invite postgraduate students (both Masters and PhD) to be a part of the initial testing period (the initial participants were known as the core participants of the project). This demographic was targeted for the initial stages, as they were the most likely to contribute based on research into other community websites (see section 6.1.4). Teachers and other researchers were also encouraged to take part in the initial beta as well, but indeed the focus was initially on postgraduate students.

As previously stated the beta stage of the project was intended to test the then platform MediaWiki; however the ultimate long term goal was to build an ensemble of dedicated participants that would provide a building block for a larger community. To encourage contributions from the initial core participants an

incentive was developed. As part of the overarching research project it was decided that contributors of the initial beta stages would be invited to present their analyses at one of the three symposiums organised and funded by the project²⁵⁰.

6.3.2 In the beginning there was MediaWiki – the beta period of the OREMA project

The OREMA beta website went live in March of 2011. Over 12 participants took part at the beginning of the beta testing whilst other participants joined throughout the rest of the first year. Compositions were suggested to the community bimonthly to maintain interest and encourage contributions. A total of four compositions were suggested to the community: *Dripsody* (1955) by Hugh Le Caine, *Étude aux chemins de fer* (1948) by Pierre Schaeffer, *Presque rien No.1 C* (1970) by Luc Ferrari and *Meattrapezoid* (2008) by Merzbow.

There were a number of considerations in the choices made for the proposed compositions. The main consideration was their duration. None of the works presented above are over five minutes in length. This is not to say that there is a limitation on the length of a piece, rather it was assumed that many of the contributors had other commitments and could not devote a lot of time in the initial beta version of the project. Another reason these compositions were chosen was

²⁵⁰ Not the OREMA project, rather the New Multimedia Tools for Electroacoustic Music Analysis project.

that they were all different. *Dripsody* and *Étude aux chemins de fer* are both early examples of *musique concrète* that employ different techniques in their composition. *Presque rien No.1C* was introduced to have an example of anecdotal music, one that would perhaps require different strategies to the previous two works. The final work to be introduced to the core participants was a noise piece by Merzbow called *Meattrapezoid*; a work that can be considered vastly different to the three previously mentioned.

The initial structure of the website resembled that of Wikipedia. The main reason for this was because they both shared the same platform. Figure 29 is an image of the front page of the front page from the beta stage of the project.

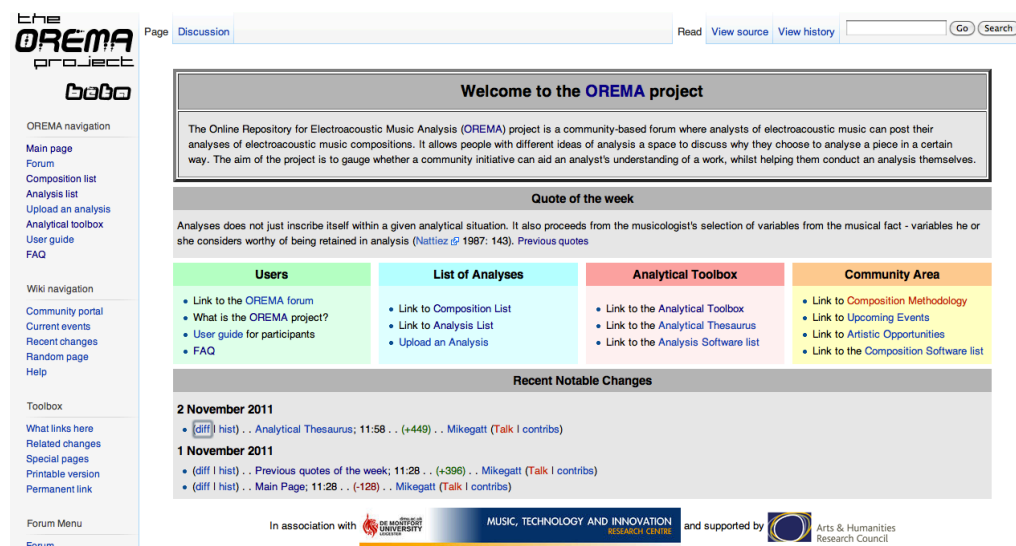
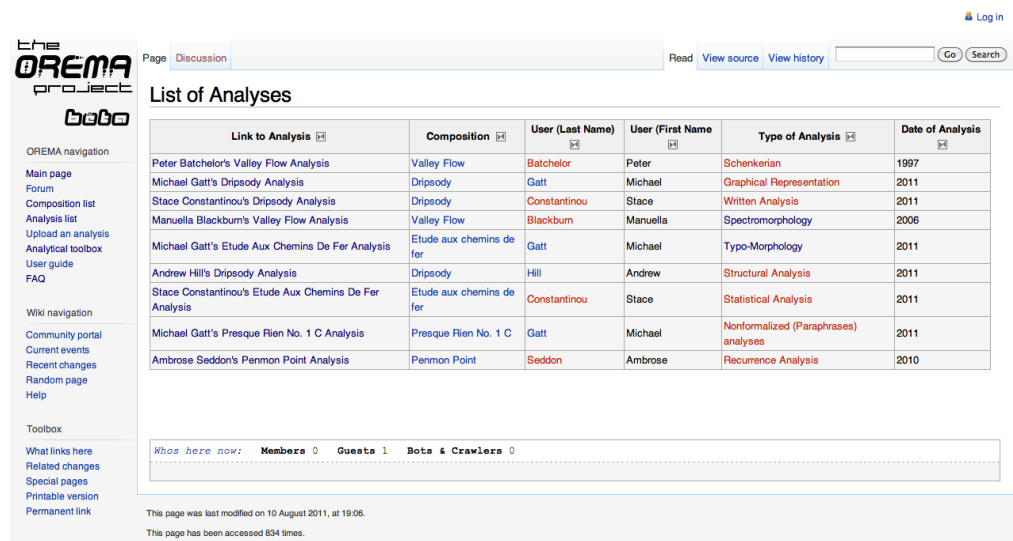


Figure 29. Front page of the OREMA website running on the MediaWiki platform.

Navigating the website and assigning paths was somewhat difficult with the

MediaWiki platform. Colours were assigned to the then four main sections of the website: list of analyses, the analytical toolbox, the forum and the community area²⁵¹. The majority of the information held within these sections was organised in tables, as depicted in Figures 30, 31 and 32 below.



The screenshot shows the 'List of Analyses' page on the OREMA project website. The page features a sidebar with navigation links and a main content area with a table of analyses. The table has columns for Link to Analysis, Composition, User (Last Name), User (First Name), Type of Analysis, and Date of Analysis. Below the table, there is a 'Whos here now' section showing 0 members, 1 guest, and 0 bots/crawlers. The page footer indicates it was last modified on 10 August 2011 and has been accessed 634 times.

Link to Analysis	Composition	User (Last Name)	User (First Name)	Type of Analysis	Date of Analysis
Peter Batchelor's Valley Flow Analysis	Valley Flow	Batchelor	Peter	Schenkerian	1997
Michael Gatt's Dripsody Analysis	Dripsody	Gatt	Michael	Graphical Representation	2011
Stace Constantinou's Dripsody Analysis	Dripsody	Constantinou	Stace	Written Analysis	2011
Manuella Blackburn's Valley Flow Analysis	Valley Flow	Blackburn	Manuella	Spectromorphology	2006
Michael Gatt's Etude Aux Chemins De Fer Analysis	Etude aux chemins de fer	Gatt	Michael	Typo-Morphology	2011
Andrew Hill's Dripsody Analysis	Dripsody	Hill	Andrew	Structural Analysis	2011
Stace Constantinou's Etude Aux Chemins De Fer Analysis	Etude aux chemins de fer	Constantinou	Stace	Statistical Analysis	2011
Michael Gatt's Presque Rien No. 1 C Analysis	Presque Rien No. 1 C	Gatt	Michael	Nonformalized (Paraphrases) analyses	2011
Ambrose Seddon's Penmon Point Analysis	Penmon Point	Seddon	Ambrose	Recurrence Analysis	2010

Whos here now: Members 0 Guests 1 Bots & Crawlers 0

This page was last modified on 10 August 2011, at 19:06.
This page has been accessed 634 times.

Figure 30. List of analyses of the OREMA website running on the MediaWiki platform.

Figure 30 shows all the analyses submitted to the OREMA project prior to the change to the Drupal platform. One will notice that some of the compositions analysed were not listed within the proposed analyses within the beta period of the project. Contributors submitted these analyses, the majority of whom were from teachers of some description, who could not devote any time to the four suggested compositions. Instead they decided to submit analyses that they had undertaken

²⁵¹ The community area was initially a place where the participants shared information and discussed other aspects of electroacoustic music outside the realm of analysis.

as part of their postgraduate studies, updating the information if required.

A detailed history of all the pages on the wiki was outlined within the *View History* tab seen in the top corner. For the analyses this included major changes in perspectives and methodologies. This functionality was extremely important and continued through to the Drupal platform. One aspect that was not implemented within the Drupal platform was the recent changes list on front page as seen in Figure 28.

Name	Author/Organisation	Publication	Revisions	Type of Electroacoustic Music	Related Tools
Spectromorphology	Denis Smalley	1986 1997	1	Acousmatic	Spatiomorphology Typo-Morphology
Indicative Fields	Denis Smalley	1993	0	Acousmatic	Spectromorphology
Gesture and Surrogacy	Denis Smalley	1986 1997	1	Acousmatic	Spectromorphology Spatiomorphology Indicative Fields
Typo-Morphology	Pierre Schaeffer	1966	0	Acousmatic	Spectromorphology
Language Grid	Simon Emmerson	1986	0	Acousmatic	
Acoustic Chains	Monty (Mathew) Adkins	1999	0	Acousmatic	Indicative Fields
Unités Sémiotiques Temporelles	Laboratoire Musique et Informatique de Marseille	1996	0	Acousmatic	
Grille Fonctionnelle	Stéphane Roy	2004	0	Acousmatic	
Theory of Oppositions	Robert Cogain	1985	0	Acousmatic	
I-Son	François Bayle	1986		Acousmatic	
Faktura	Marc Battier	2003		Acousmatic	
Aesthetic-Cognitive Analysis	Giomi Francesco and Marco Ligabue	1998		Acousmatic	

Whos here now: Members 0 Guests 1 Bots & Crawlers 0

Figure 31. Analytical toolbox articles index as seen on the OREMA website running on the MediaWiki platform.

What became apparent was that the community were not interested in creating a thesaurus of terms concerning electroacoustic analysis. This part of the website was later disbanded due to lack of interest. Instead, users were redirected to the

Ears website (www.ears.dmu.ac.uk) for further clarification on the terms used throughout OREMA.

The screenshot shows the OREMA Forum interface. On the left is a sidebar with navigation links. The main area displays a list of forum topics with columns for the topic name, number of topics, number of replies, and the last post.

Topic	Topics	Replies	Last Post
OREMA Discussion Area			
Discussion of Analyses A place to discuss the analyses currently hosted on the OREMA wiki	10	31	Michael Gatt's Presq... Sep 20th 6:42 pm SimonEmmerson
Analytical Toolbox Discussion A place to discuss and suggest new analytical tools for electroacoustic music	2	2	Some thoughts on the use... Oct 20th 9:14 am PancosAmekides
General Discussion			
General Questions General questions regarding the wiki's functionality and usability	3	9	60-minute analyses Oct 14th 10:50 pm PancosAmekides
Suggested Improvements A place to suggest improvements for the wiki	2	5	Possible additions Jul 28th 3:15 pm Mikegatt
Community Area			
Upcoming Events A place to notify other OREMA members of upcoming electroacoustic events.	2	0	Edi-Point @ sound lab 3 Jul 28th 8:41 pm TimothyCooper
Artistic Opportunities Calls for works and/or bursaries and award schemes.	1	0	CALL FOR WORKS Jul 28th 3:23 pm Mikegatt

Forum Stats
User 10 Thread 20 Topic 48 Max users at one time 20

Figure 32. The community forum of the OREMA website running on the MediaWiki platform.

Interestingly the biggest contribution to the forum occurred within the beta stage of the project. Many of the core participants were extremely enthusiastic with the concept and the potential future implementation and expansion of the project. It was at this point that other discussions were permitted in the forum. In the Drupal platform this functionality was replaced with a GoogleGroup dedicated to the participants, allowing for communication of events and other initiatives outside of the project's scope.

6.3.3 ...and then Drupal came to pass – the change in platform

As time went on it became apparent that the MediaWiki platform was unsuitable for the purpose of this particular project. Although it offered considerable flexibility it came at a cost. The primary concern was that it was just too difficult for end-users to use. Participants were required to add data to a lot of different pages in order to publish just one analysis. It was also hard to find information on the website. Users were often confused, not only in the publication of an analysis, but also when they tried to find others. The maintenance of the site was also a concern, as there were no simple methods of adding information or publishing news. Measures were taken to try to improve usability of the website by adding third-party extensions, but these only resolved smaller administration and end-user related problems and did not address the wider issues the platform presented. The platform was fundamentally incompatible with the requirements of the project and it was decided that a change was necessary.

MediaWiki is a useful tool for supporting group collaboration but when we apply it to the academic setting, we need to consider and adapt some features to match the needs of the classroom environment, which requires mandatory collaborative writing (Kasemvilas and Olfman 2009: 61).

The platform that was chosen for the new OREMA website was Drupal. Whereas MediaWiki is a wiki-based platform Drupal is a content management system. The main difference between these two platforms is the method by which they handle content. A wiki allows users to create pages, which can then be linked through the

use of hyperlinks. There were some rudimentary tables that allow users to organise content, but these still need to be programmed individually by the user. A content management system works by defining content types, which are then filed in the same area of the website. Moderators are then able to group certain content within a content type by arguments. In short this means that end-users only need to submit an analysis with one standard input page. Once finished they simply click *publish* and the system, set up by the administration, takes that data and sorts it automatically. Furthermore, if a change needs to be made to the format of a content type the administration only needs to change the parameters of that particular type, rather than tracing back through all the content on the website to ensure consistency. In effect the website changed from an open wiki format to a “closed environment scenario” (Boulos, Maramba and Wheeler 2006) where content was filtered and distributed accordingly, without the unnecessary clutter and required knowhow from the end-user.

The change in editing rights meant that only authors of the analyses had the ability to edit and adapt or even revert to a previous version of their work if necessary. This meant that the analysis section of the website effectively became a self-publishing platform where an analyst could upload an analysis as and when they wanted. Interaction with readers was sustained through comment boxes underneath, which any user could access and contribute to the overall discussion. The analytical toolbox articles never intended to be authored in the traditional

sense, rather they are collaboratively written by the community. The same principles adopted within the wiki platform were continued in the new incarnation. In both cases being able to view past iterations of a publication might offer a great insight into how methodologies are viewed and how understandings change and evolve over time.

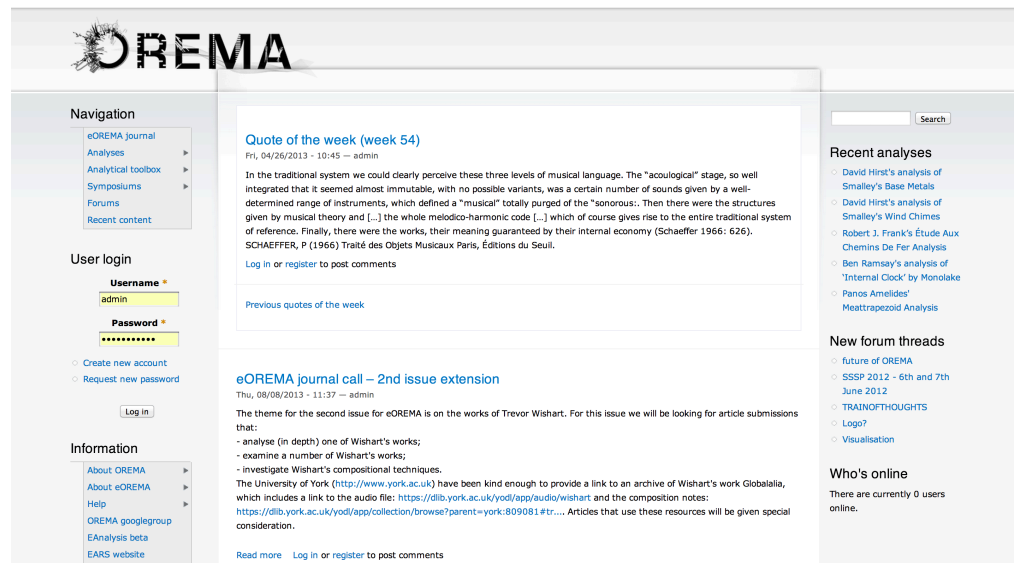


Figure 33. Front page of the OREMA website post platform change.

The majority of the information that had been collated in the MediaWiki version of the OREMA website was transferred to the new Drupal platform. Unfortunately, not all the information could be replicated on the new site. Discussions that had taken place in the forums of the previous website could not be transferred to the new one as a consequence of the system change. The new version of the OREMA website was released in December 2011, still within the beta stage of the project.

Create Analysis

[Home](#) » [Add content](#)

Title *

NOTIFICATIONS

☐ Do not send notifications for this update.

SPAMICIDE

ANALYST'S NAME * [Show row weights](#)

+	
---	--

[Add another item](#)

Year of analysis *

Composer's name (full) *

Composition title *

Year of composition *

Description * [\(Edit summary\)](#)

Rich-text editor toolbar: Bold, Italic, Underline, Bulleted list, Numbered list, Indent, Outdent, Link, Unlink, Source, Undo, Format, Font, Size, Styles.

[Disable rich-text](#)

Text format: Full HTML

[More information about text formats](#)


Figure 34. New user-friendly upload section of the OREMA website.


Drupal allows for administrators of websites to create templates for types of user generated content. Any content created with these templates by users are automatically sorted into the correct area of the website (something that was not possible in the pervious platform MediaWiki). This means that a user only has to fill out one page of information to upload an analysis or analytical toolbox article. An example of such a page is shown in Figure 34.


Revisions for *Michael Gatt's Étude Aux Chemins De Fer Analysis*
[View](#)
[Edit](#)
[Revisions](#)

Revisions allow you to track differences between multiple versions of your content, and revert back to older versions.

Revision	Operations
06/13/2012 - 14:20 by mikegatt	<i>current revision</i>
06/13/2012 - 14:19 by mikegatt	revert
06/13/2012 - 14:17 by mikegatt	revert
New version of representation created with EAnalysis.	revert
02/14/2012 - 14:48 by mikegatt	revert
01/23/2012 - 17:40 by admin	revert
01/23/2012 - 17:39 by admin	revert
12/05/2011 - 12:11 by admin	revert
12/01/2011 - 16:21 by mikegatt	revert

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Figure 35. Example of revisions of one analysis on the website.

Just like the wiki pages within the MediaWiki incarnation of the OREMA website the Drupal version saved the historical changes of both the analysis pages and analytical toolbox articles once an alteration had occurred. All users could access this information by clicking the *revision tab* within a page, as demonstrated in Figure 35.

6.3.4 The path to a community is onerous for the open access believer – The later years

The beta stage of the project ended in March of 2012. An open call was sent to various emailing lists and worldwide institutes asking for participants. It requested

participants from a range of backgrounds including: composers, musicologists, practitioners, enthusiasts, teachers and students. At that point in time there were twelve analyses uploaded to the OREMA website, covering seven very different compositions. The core participants were still active, but the initial incentive of presenting at one of the symposiums had already taken place²⁵², meaning that there was no other motivation for the users other than potentially normative and need-based commitment reasons (Ren 2011: 102; 105)²⁵³. The hope was that the website had reached critical mass by this point, with the original core participants encouraging newer members to contribute in leading by example. Unfortunately, this was not the case.

Although there was a sharp spike in the creation of user profiles²⁵⁴ on the website less content was submitted overall. There were a few instances where users uploaded old analyses or links to previously published analyses, but nothing of particular merit. The focus that the initial composition choices provided and the original incentive of presenting one's findings were not present in the release of the project.

²⁵² This symposium took place on the 29th of February 2013 and had contributions from five of the core participants.

²⁵³ As outlined in section 6.1.3.

²⁵⁴ A total of 84 profiles were created and authorised as of writing this thesis.

6.3.5 The eOREMA journal

To combat the lack of contribution interest within the main site another initiative was conceived to allow for another avenue to publication, as demonstrated in Table 8. An open access journal, latter called the eOREMA journal, was devised. It was intended to act as a biannual publication arm of the OREMA project that would consist of peer-reviewed content of analyses of electroacoustic musical works and articles discussing the subject of electroacoustic music analysis²⁵⁵. The intention was to not only encourage interest in the journal itself, but that this interest would filter through to other areas of the website.

The OREMA project	The eOREMA journal
Accepts analyses and submissions to the analytical toolbox	Accepts articles that discuss electroacoustic music analysis
Content can be added by users of their own accord	Peer-review process before content is accepted
Content can be added at any time	Articles are released bi-annually
Amendments can be made to content once published	Content cannot be changed once published
Referencing as if webpages	ISSN and DOIs for individual articles
Open access: free to submit and view	Open access: free to submit and view

Table 8. Differences between publication through the OREMA project website and the eOREMA journal.

In preparation for the eOREMA journal a call for peer-reviewers was sent out. A total of 15 reviewers were assembled, all from international and academically

²⁵⁵ Up until the release of the first issue of eOREMA there were no means of producing academic peer-reviewed articles on the website.

accredited backgrounds²⁵⁶. A call was sent in October 2012 again to various international mailing lists requesting articles covering one or more of the following themes:

- New analytical tools or methodologies;
- Discussion of existing analytical tools or methodologies;
- Analysis of a particular category of electroacoustic music or an analysis of an electroacoustic music composition.

A total of 8 submissions were received; 6 of which were considered publishable by the peer-reviewers and were subsequently disseminated in April 2013. These articles again covered a range of different topics from: reimagining of existing analytical tools (Emmerson 2013), an article discussing the possibility of analysing installation art (Batchelor 2013) and analyses of acousmatic works (Hirst 2013), electronic dance music (Ratcliffe 2013) and soundscape compositions (McConaghy 2013); reflecting the intended scope of the OREMA project in general.

The call for the second eOREMA journal was sent in March 2013. Rather than a generic call a theme was created around the works of Trevor Wishart. The University of York graciously provided a portal to files for one of his work *Globalalia* that was recently archived on their server. Within the archive users could access

²⁵⁶ The reviewers for the eOREMA journal were: Dr Simon Atkinson, Prof Marc Battier, Prof Michael Clarke, Dr John Dack, Prof Simon Emmerson, Dr David Hirst, Prof Andrew Hugill, Dr Gary Kendall, Prof Leigh Landy, Dr Cathy Lane, Dr Katharine Norman, Prof Robert Normandeau, Prof Tae Hong Park, Prof Peter Stollery and Prof John Young.

freely the work and the accompanying compositional information Wishart had created whilst composing the piece. The call was still open to other submissions, but special consideration was given to those that investigated the works of Wishart. Unfortunately, there was less interest from contributors, even after an extension to the deadline. There were also delays with some peer-reviewer feedback, pushing the journal publication back further. The issue was eventually released in October 2014.

6.4 An analytical community in action – analysis of results

Although the interest in the project did dwindle towards the conclusion of the AHRC project there were some interesting results that can be investigated and discussed. This section will look at the individual components of the OREMA project (the analyses, the analytical toolbox and the forum) along with the eOREMA journal and the standout participants that used the website.

6.4.1 Analyses

There was one instance where interaction and the publication of an analysis inspired another original contribution from a participant. One such example was from an analysis of *Dripsody* submitted by the author of this thesis (Gatt 2011a). The analysis was a sound-by-sound aural perspective of the work, detailing the minute event relationships within the work. Within the comment field of the analysis another participant, Andrew Hill, questioned the overarching structures within the work:

I think that from looking at this representation it was difficult to get an idea of the overall structure of the piece. Perhaps it would be better to have an overview of the whole piece before delving down into the particulars and details of the work. This also gives us an opportunity to analyse events within the context of the work as a whole as opposed to a stream of events (Hill quoted from comments section of Gatt's *Dripsody* analysis 2011).

Other users also commented on the intricate nature of the analysis:

The image is extremely successful as an evocative representation of 'Dripsody'. What is interesting is that there is also a first step in terms of defining sections of the work, again evocatively. But on neither file (pdf in which scrolling from short section to short section is an issue unfortunately, aks) is there a supporting text to describe the symbols and large-level descriptions. It would be nice to have seen both at once (Landy quoted from comments section of Gatt's *Dripsody* analysis 2012).

Before the original analyst could revise his initial analysis the participant created his own, which investigated the larger structural relationships within the work (Hill 2011). Landy, whose comment can be read above, continued his discussion within the comments section of the new analysis:

It is interesting to note how structural items are layered in this short work. Again new types of image are being combined with well developed types of general analytical means of presentation and I note a 'proper distance' from Schaefferian terminology and image demonstrating that there are obviously alternatives (Landy quoted from comments section of Hill's *Dripsody* analysis 2012).

This interaction is the perfect example of how the OREMA model was supposed to work. Neither analysis professed to be the one true perspective of the work rather they complemented one another. Both analyses also brought up questions regarding the different perspectives they presented, sparking responses from the readers.

Hill's analysis of *Dripsody* was also an example of where an author of an analysis made changes to it after its initial publication. Figure 36 shows the two versions of the analysis side by side. The change occurred as new software was made available that suited the analyst's needs.

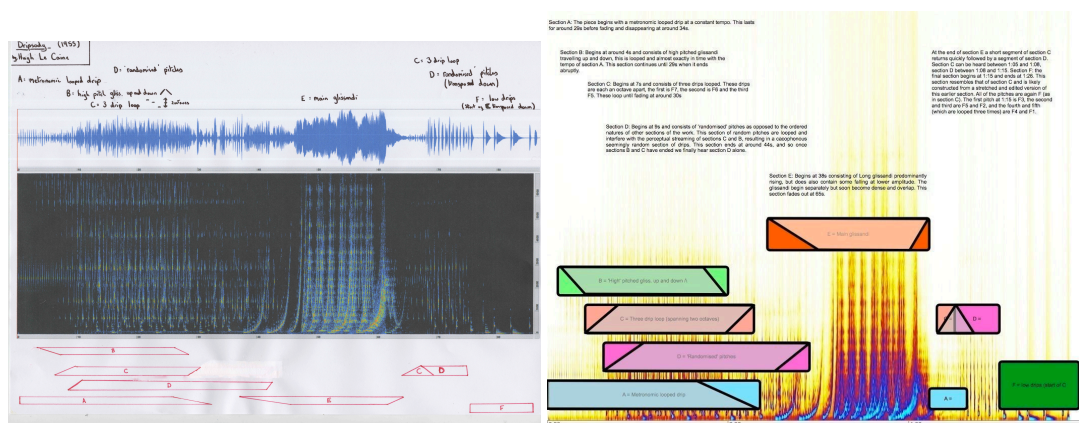


Figure 36. Example of changes to an analysis from a handwritten analysis (left) to a computer rendition (right) taken from Hill (2011).

In one particular instance the community interaction encouraged major changes to an analysis. The analysis in question is the same as can be found in subchapter 5.2 and an online version (Gatt 2011b) – the typo-morphological analysis of *Étude aux chemins de fer*. The original version was created with the Acousmographe and contained no overarching structure as depicted in section 5.2.2.2. There were also minor changes to the content in the version, but nothing noteworthy to mention. Figure 37 shows the two first pages of both iterations of the analysis²⁵⁷.

²⁵⁷ This analysis was later investigated further and forms part of this thesis submission (section 5.1).

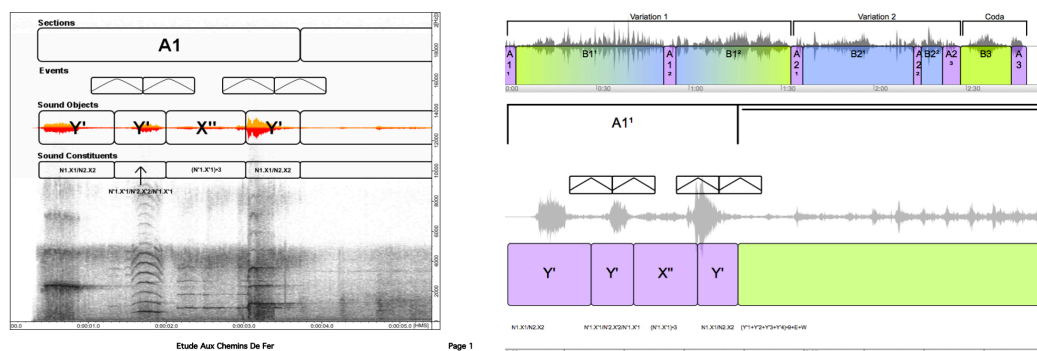


Figure 37. The two first pages of both iterations of the *Étude aux chemins de fer* analysis. The left taken from Gatt 2011b and the right is the first page of the analysis from section 5.2.

Many assumptions were made when the project was first launched. One of the presumptions was that the original core members would have a good understanding of concepts and methodologies such as Smalley's spectromorphology. However, it later became apparent that some members had not encountered such ideas, rather their expertise were in computer-aided analysis as opposed to aural analysis, which the majority of analyses on OREMA were at the time (and still are up until this point). What this meant was that some of the participants did not have the same specialist terminology that many others within the electroacoustic community take for granted. The outcome of this was that some of the participants borrowed terms from other disciplines to communicate their perspectives. One such example was from Constantinou's analysis of *Dripsody* (2011a). In his analysis he segmented the work using the drips as a metre. What he discovered was that the crescendo in the middle of the work coincided with the golden mean ratio. No other analyst noticed this aspect of the work. Surowiecki

(2004: 30) states that having people within a group who know less, but have different skills, can actually improve a group's performance. Now that is not to say that Constantinou was any less capable of contributing an analysis compared to other contributors, rather that his unique perspective offered a completely different outlook: one that others perhaps might not have seen as they were so used to describing electroacoustic works with specialist terms, such as spectromorphology.

As previously mentioned some senior lecturers, who were members of the original core participants, uploaded older analyses of electroacoustic musical works, provided that there were not previously published elsewhere. Two analyses fell into this category, both of which were analyses conducted as part of the analysts' undergraduate studies. By some fascinating coincidence the two analyses investigated the same composition, which was Smalley's *Valley Flow* (1992). Both analyses offered a different perspective: Batchelor's analysis is a Schenkerian inspired analysis (Batchelor 1997) that aims to reduce the work to a fundamental pitch structure, whilst Blackburn's analysis (Blackburn 2006) uses Smalley's own spectromorphological terms to describe both foreground and background sounds. The two authors latter discussed the two different approaches in the comments section of the Blackburn's analysis. Batchelor begun the exchange by saying:

Certainly it draws attention to a great deal of detail which I find myself listening to in a different way when not preoccupied with specific pitch content(!) and the discussion of the interaction between surface and background is useful. The only thing that I remain curious about is how this relates to long-term structure and its perception. I wonder whether some

kind of reductive analysis (I suppose I'm bound to propose this since my own was reductive) along these lines would reveal other connections (or consistencies in compositional approach) between foreground and background (Batchelor quoted from comments section of Blackburn's *Valley Flow* analysis 2012).

Blackburn response was:

A reductive analysis would be a good idea and natural step forward. This has been the question posed in all the feedback I have received so far on the work and I can see in retrospect how the one-minute segments divert attention away from examining long-term structure. It is interesting that I appear to work in a similar way compositionally - I seem to work more on micro-level detail, leaving larger-scale structuring to a later time (Blackburn quoted from comments section of Blackburn's *Valley Flow* analysis 2012).

This sort of communication is one of the main reasons for creating OREMA, to allow for a discourse to form between analysts and readers; and in this case between practitioners. Again like the two analyses of *Dripsody* listed above these two analyses are not meant to be in direction competition, rather they were intended to provide the different perspectives for the same composition.

The analysis that pushed the boundaries of the scope of the project was an analysis of an audio-only game called *Papa Sangre* (2010) undertaken by Hugill (2012b). Within the analysis Hugill documented his experience of playing the first three levels of the audio-only game by using Costello's *Pleasure Framework* (2007) to describe changing perspectives. This was a very innovative analysis, which Hugill has expanded to a chapter of a book yet to be released. It also received

praise from one of the creators of the game²⁵⁸.

There were of course other submissions not documented here. These submissions ranged from original contributions from the core participants to later submissions from participants after the beta stage ended. Many of the later submissions were either descriptions of previous analyses undertaken or direct links to external websites. These types of submissions fall under the repository remit of the project, as no material published elsewhere was stored on the site.

6.4.2 Analytical toolbox

A total of 18 toolbox articles were submitted throughout the project; the author of this thesis wrote 17 of these. David Hirst was the only other contributor who wrote the remaining article. This ratio showed a real inequality regarding the authoring of community articles as described by Nielsen (2006). The community did not edit or amend any of the content; the potential ramifications could have been that one person's biased opinions could have become the status quo. As the majority of articles were written by the website creator one might assume that it was not his intention to promote a biased view; however, there was one person who did challenge the use of some terminology and even the structuring of the site:

²⁵⁸ Discussion between one of the creators of Papa Sangre and Hugill outside of the OREMA website: <http://allplayall.blogspot.co.uk/2012/02/academic-nightmare.html>

I think that spectromorphology is neither a compositional nor analytical tool. One cannot compose using spectromorphological terms. On the other hand I have made two analyses of pieces by using exclusively spectromorphology as an approach to analysis and terminology. Then I realised that it's not suitable for analysis. The most important barrier is that one cannot use an idea or a term from spectromorphology in different temporal and structural scales. Also, spectromorphology itself examines the sound in respect to time, this automatically becomes a barrier: it is because one sound never remains the same from millisecond to millisecond, any term will stop being valuable when the sound has changed, i.e. In the next millisecond.

I am of the opinion that one can use it in analysis but in a macro-scale more than in micro-scale level, due to the reason I have mentioned above.

Spectromorphology is an "ex post" theory that helps us understand our listening experience and not to describe it. Therefore, it outlines the way we perceive sound and from that point of view doesn't make much difference from the theory of Pierre Schaeffer, e.g. The seven criteria that help us in understanding sound (Amelides quoted from the OREMA website forum 2011).

Amelides did not contribute any more to the discussion or edit the spectromorphology article on within the toolbox, to which he was referring. No one within the community responded to his post and so it was left unanswered, not that it was really a question in the first place. The contribution of this user will be investigated in more detail later on, however he still remains, other than Hirst, the only person to contribute to the discussion surrounding the analytical toolbox and the tools within.

6.4.3 Forum – community discussion

The majority of the discussion that occurred during the OREMA website's lifetime was in the beta stage of the project between the core participants. Unfortunately, many of the original discussion threads within the MediaWiki website were lost in the switch to the Drupal as the architecture between the two platforms was not

compatible. However, screenshots were taken to archive the discussions that took place. A few interesting discussions began between participants. Inevitably the topic of terminology was raised, this time by Constantinou:

The term 'Electroacoustic Music' seems to me to be very useful because it is a very broad term. I would like to suggest that it has the broadest possible meaning; it is an umbrella term. Underneath this broad umbrella are other types of sub-categories: musique concrete, acousmatic, radiophonic, glitch, sound art, soundscape, (others?...). I wonder to what extent I am wrong or correct about this? I would really like other people's thoughts on and around this subject (Constantinou quoted from the OREMA website forum 2011).

This triggered a response from another OREMA participant:

I'm a fan of the term electroacoustic as a kind of meaningless moniker. Although that then develops the issue of describing or attributing what you are actually doing. A term like glitch is descriptive and there is a clear aural connection between the two.

Soundscape is one of the accepted terms I've never felt comfortable with. For some reason it seems to imply something that is less considered or crafted than it should be. That's not to say that's the case. (Cooper quoted from the OREMA website forum 2011).

This interaction my caught the attention:

I do believe this is a very hot topic that will no doubt be one that is constant throughout the OREMA project. I should mention that I did adopt the term from the EARS website under the genres and categories. Perhaps it might be useful to create [a thesaurus of terms] within the project to add our own content (Gatt quoted from the OREMA website forum 2011).

The discussion finished there and prompted me to create a thesaurus section on the website, which was not popular and later dropped in the switch between platforms. This particular dialogue has not be examined however for that failing, rather that is an example of one of the few organic discussions to occur within the forums that I did not try to orchestrate in any way.

In 2012, to infuse interest in the forum, the website creator came up with three simple questions for further discussion: *what is analysis?*, *who is it for?*, and *why analyse?* These questions remained unanswered with only a few members contributing after the website creator requested that members devote some time to meet with other participants at the same time online. The outcome of this formed the beginnings of some interesting discussions that inevitably did not continue past the set meeting time. It was clear that the participants did not want to communicate through the forum of the website. Many preferred to communicate through other forms of social media, through the GoogleGroup emailing list, emailing the website creator directly or in informal conversations. Perhaps the most frustrating aspect of the project was that some of the most interesting discussions were not recorded and took place in informal social meetings where the participants were present all at once.

6.4.4 eOREMA outcome

The first issue of eOREMA could certainly be considered a success, demonstrating the intended scope both in terms of content (analyses and analytical tools) and subject (acousmatic music, electronica, installations etc.). However, the second issue presented many problems. There was an unmistakably reduced interest in submitting to the second call. This might have been because the scope was focused on a particular composer (even though the call did state other submission

outside the theme would be welcome). The reduced interest and the delays really did affect the momentum of the issue as some articles were left unreviewed for a number of months. This is not to say that the reviewers themselves are to blame for the problems associated with the second issue, far from it. After all they were working in kind for the website creator and editor of the website. It was down to a lack interest from the community, which unfortunately affected the enthusiasm of the organisers.

Although the release of the first issue did increase traffic to the website (and the creation of new user profiles) it did not create any interest from the participants to contribute to the main website. By providing another avenue to publication that involved a peer-review process it could have undermined the peer-to-peer aspects of the project. The journal did not fall within the community aspects and ethos that the project was initially trying to instil; participants were encouraged again to work individually and not collaboratively. Rather than having a separate avenue to publication, a hybrid form could have been developed where analyses submitted to the site could have been put forward for the peer review process as well and kept on the site regardless of the outcome.

6.4.5 Key contributors to the project

There are a number of participants that demonstrated the potential advantages of an open access peer-to-peer analytical community. This is not to diminish the other

contributions to the website, just to highlight those individuals whose high contributions helped the project and the initiative.

6.4.5.1 The initial contributor – Stace Constantinou

Constantinou was one of the first contributors to the site and remained so throughout the beta stage of the project. His contributions and interactions are of a particular interest as he was one of the few people to vocally ask for verification on concepts he was unaware of. Both his analyses (Constantinou 2011a and 2011b) are examples of him applying other methodologies from other fields to communicate his individual perspective, which was extremely interesting for those participants who were used to other tried and tested approaches:

What is fascinating about this analysis of 'Dripsody' is that it leans comfortably on more traditional analytical presentations. Naturally this is partially due to the rhythmical character of the piece, but that is not all. Micro-level description coincides with high-level markers (not applicable to all e-a music, naturally) and the golden mean remark is quite a find (Landy quoted from comments section of Constantinou's *Dripsody* analysis 2011).

Constantinou left the project after the relaunch due to other work commitments. His departure was a blow for the project, as no one else joined the project afterwards that challenged the academic norms that many of the participants were used to.

6.4.5.2 The adopter of values – Andrew Hill

Andrew Hill²⁵⁹ was a prolific user of the website, commenting on most of the analyses and contributing to forum and mailing list discussions. He was also one of the only analysts as well to take note of what had already been contributed and then provide his own perspective, filling in the gaps that were perhaps missed by the analyses. Although he only submitted one analysis his contribution was greater to the site as Hill was helping in other areas, such as the *quote of the week* section on the front page, providing new texts from which to reference.

6.4.5.3 The ambassadors – Peter Batchelor and David Hirst

The two main ambassadors for the project were Peter Batchelor and David Hirst. Both participants were extremely enthusiastic, both in their contributions to the website, the journal and the online discussion, putting forward new ideas to the community²⁶⁰. Both are experts in their respective fields and were willing to spend their time and energy in all the aspects of the OREMA project, potentially strengthening the appeal and validity to other potential contributors.

6.4.5.4 The innovator – Andrew Hugill

The analysis from Hugill was the most impactful analysis that was submitted to the

²⁵⁹ Now a PhD in Music, Technology and Innovation.

²⁶⁰ Batchelor came up with the idea of a 30-minute analysis in response to the lack of interest from the participants. This culminated in gatherings within De Montfort University where postgraduate students were asked to listen to a piece and begin to analyse it. Unfortunately, these participants did not ultimately submit the analyses, fearing they were incomplete.

OREMA project. Not only did it prompt a reaction from the game creator, but also it was subsequently expanded into a book chapter, meaning the initial submission became a draft of some description. Not only was this submission innovative, pushing the boundaries of the project, but it also demonstrated the potential impact the project could have if likeminded individuals were to devote their time to creating and indeed sharing analyses of such a high academic standard.

6.4.5.5 The provocateur – Panos Amelidies

The most provocative participant of the project was Panos Amelidies. He was very vocal about his beliefs in music analysis, even including the following paragraph within his own analysis of *Meattrapezoid* (Amelides 2012):

My consideration, and the reason I am trying to open a discussion on that issue derives from my personal question, which is: do I really need analysis as we know it in western musical education? I have no dogmatic opinions nor I am against analysis by default. I am classically trained musician and I did quite a lot of analysis during my studies (both for paper and studio composition). In particular, in *Meattrapezoid* by Merzbow, where the genre define the listening experience and the outcome, do we really need to cut it into segments, or to apply any kind of analytical theory in the piece in order to understand its functions or the pleasure or dislikeness [sic] it causes to the listener? I would like to trigger a discussion on how we define understanding, and how we as musicians see ourselves within the context of analysis.

The website creator responded to this conclusion within the comments section of the analysis:

I must admit that I think you answered your own question at the end as I found your analysis very thought provoking. It gave me a perspective into how you viewed the piece; a perspective very different to my own. I believe there is great value in that. Analysis is not just segmentation, but also the communication of an idea or concept relating to a piece of music. How you use this information is up to you, but there are certainly uses for analyses

which I hope OREMA facilitates (Gatt 2012 quoted from the comments section of Amelides' *Meattrapezoid* Analysis).

This was the end of the conversation, as Amelides did not respond. One might presume that Amelides was viewed as being slighting unhelpful and a nuisance to the project. However, considering Surowiecki's (2004: 10) four conditions for a 'wise crowd' Amelides demonstrates strong independence with his views, even questioning the need for analysis and, in doing so, the project itself. However, what was lacking was a wider discussion from other members of the project other than the author who was always going to disagree with him. This provocative question needed a balanced argument from other people with different views, which were never voiced on the website.

6.4.5.6 The commentators – Simon Emmerson and Leigh Landy

The two project co-ordinators for the grander project *New Multimedia Tools for Electroacoustic Music Analysis* were part of the biggest contributors to the discussion for each analysis that was submitted. It was thought that having them be part of the discussion would attract other comments from other participants. Interestingly, after a videoconference meeting with some of the participants, it became apparent that many of the users did not want to take part in the online discussion where both Landy and Emmerson had already contributed. Their fear was that they did not want to disagree with a prominent figure within the community in a public forum for everyone to see. This fear of publicity might also account for

the lack of responses within the online forum and comment sections of the website.

6.4.5.7 The lurkers

Although silent, the lurkers were the most prolific users of the website. Unfortunately, it was hard to gauge the impact that the project had outside of the interactions on the website that occurred and subsequently recorded. In February of 2014 the OREMA website (including the eOREMA journal) was averaging at 10 visits per day and just over 400 each month; 40% of which from the United Kingdom, 12% from the United States and around 5% from Italy, Canada, Portugal and France. The problem is that it is not possible to ascertain if these were actual passive users, or just BOTs scanning the website. There was certainly enthusiasm from audience members when the project was presented, many of whom stated informally that they were aware or had used the project, but these testimonies were never written or documented on the website or elsewhere.

6.5 Chapter summary

Maintaining interest within the community has been the most difficult aspect of the OREMA project. The core participants at the beginning perhaps felt an obligation to contribute; however, the momentum that was felt within the closed beta stages of the project was not continued into the release of the website. Any of the normative commitment (Ren 2011: 102) that the core participants felt was eclipsed by the work commitments they had. The project did not provide the added value or active community that would have inspired any needs-based commitment (Ren 2011: 105) from any of the participants, core or not. It was thanks to a select few of contributors who maintained the community dynamics throughout the project, encouraging new people to submit. However, to some extent, this was to no avail. The ultimate failing of the project was that there was no incentive, no reason to submit a work²⁶¹. Within the smaller core participant community people interacted within one another, as it was new and a somewhat closed community. They contributed even though the platform was not user-friendly because they felt special and unique. When opened up to the wider community the project did not adapt to the new desires of the potential participants, hoping that the initial activity would continue.

²⁶¹ One might argue that the inclusion of an eJournal component to the project only exasperated this point.

The question should not be whether this is a better method of publication and knowledge transfer, rather that this is a complementary endeavour that provides another means for practitioners to work together. In theory the wiki model, potentially operating in a “closed environment scenario” (Boulos, Maramba and Wheeler 2006), could address many of the issues facing electroacoustic music analysis, but not the main one – interest in the musicology of electroacoustic music. There are clearly people interested in analysis, but they do not communicate readily with other practitioners. Is this a conditioning of academia, or is it that musicologist are generally unsociable? What is clear is that the OREMA project is a niche within a niche, only perhaps appealing to a subsection of an already rather small but diverse and wider community. If the OREMA project perhaps addressed other issues, such as pedagogy or compositional practice then these might have inspired more submissions that might have filtered through to the main cause, the analysis of the music.

7.0 Conclusion

7.1 Postscript – an archive

One criticism of the OREMA project was that it was too concerned with the analysis of electroacoustic works and not other elements, such as composition, performance and pedagogy²⁶². It was decided within the initial planning stages of the OREMA project that the focus would remain on aural analyses rather than computer-aided ones where the analyst's perception was secondary to the results from the computer. By focusing on the perception of the listener the poietic elements of a work were also considered secondary, as the interpretation of the analyst took precedent²⁶³. However, it was considered at one point if there would be a possibility of adding an archive component to the OREMA website that would allow users the ability to access content. Although no specific integration was introduced into the project there were attempts to gain access to archival material of a work, or group of works. This culminated in a collaboration with the University of York and the archive they were creating for the works and documentation of Trevor Wishart. However, there are other benefits that I will examine in this postscript about the integration of a digital archive within the concept of the analytical community.

²⁶² Of course analysis plays a major function within pedagogy, but this was not exploited in a meaningful way within the project itself. It was used as a site for reference and not a platform for e-learning.

²⁶³ This continues with the concept of the 'imperfect analysis'; a unique perspective of one listener.

7.1.1 Digital preservation – why it is important

The issues of digital preservation extend beyond maintaining the original data object²⁶⁴ over time; it is also concerned with the preservation of the knowledge associated with that datum object. Although an information object might have been migrated successfully to a new format, future generations might not know how, or have the necessary tools, to decipher it. “Changes in technology can mean that some file formats are unreadable by certain machines, while any changes in the social environment can mean that the knowledge of an object might become misconstrued, or in the worst case even forgotten” (Gatt 2010: 59). The method of how to preserve an information object and its associated knowledge is extremely important to ensure its intelligibility for future generations as outlined by David Giaretta (2007: 113):

It could be argued that one could, for example, make a digital object by carving 1's and 0's in stone – a very durable way to preserve information as the ancient Egyptians knew. However [...] while this may give one access (slow access but nevertheless it is access) – it will not maintain understandability.

The idea of a data object's intelligibility is rather important when considering any music that is electronically produced and thus leaves digital artefacts²⁶⁵, such as electroacoustic music. A Pro Tools session, for example, will contain a multitude of

²⁶⁴ This is referring to a digital object within digital preservation, which might have originally existed on another medium.

²⁶⁵ *Artefacts* is used here in the true archaeological sense, rather than ‘digital artefacts’, also known as computer errors, from computer processes.

different files that vary in format and size. Furthermore, the interrelations between these files are not inherently apparent, unless the user already has knowledge of the software, or has a program, which is able to interpret the information correctly. Without the ability to access data objects, or to understand it, future generations will not be able to use them. Beyond these reasons, and focusing on electroacoustic music in particular, I (Gatt 2010: 60) outline reasons for the need for digital preservation²⁶⁶: time, awareness, insufficient documentation, insufficient universal understanding of terms, lack of universal preservation programme, lack of universal format and lack of corresponding playback machines. Interestingly some of the problems associated with the preservation are also applicable to the analysis of electroacoustic music, such as disagreements concerning terminology (as outlined in section 6.1.2.5).

Much electroacoustic music is formed and ultimately stored on fixed media. Compositions of such nature are composed with computers or playback machines, which the composers use to arrange and manipulate sounds, ultimately creating a piece. This means that every compositional action taken by the composer is contained on their chosen fixed medium. Pieces that are acousmatic in nature are then performed²⁶⁷, by the act of projection, over a number of loudspeakers

²⁶⁶ Gatt expands on many of the points already outline by Teruggi (2004: 58).

²⁶⁷ When referring to performance, I am suggesting that there is some form of intervention, whether it is the diffusion of sound or control over parameters, by a person who for this argument will be considered a performer.

surrounding an audience. As a result these works have to be maintained by way of restoration, or in extreme cases, data migration. Other electroacoustic works, such as installations or mixed music, that might have elements that are algorithmically produced or performed are not exempt from the problems of preservation, but of course require different strategies. It may appear that hardware for the performance of particular pieces needs to be maintained in order to replicate the work. They also require a dedicated community to continue to perform the works, which in turn creates the need and rationale to pursue their safeguarding as well.

Composers expect other performers to repeat our works anticipating future performances by unknown performers through the traditional modes of music publishing and word of mouth dissemination. For electroacoustic music to comfortably and permanently integrate into the traditional flow of chamber music composers may have to adopt very simple and robust technology platforms, and at the same time performers will need to acquire some basic technical know-how (Pennycook 2008: 207).

For performances that do not require human intervention, such as algorithmic works, knowledge still needs to be maintained in case any alterations are needed to conserve the initial computer patch. “A patch may work without any accompanying explanation of its structure and functions. Of course this is not needed for today’s performance but may be vital for tomorrow’s revival” (Emmerson 2006: 218).

Many of those institutes currently dealing with problems of preservation understandably put priority on the compositions that are suffering from degradation. This is still the case with many preservation projects and initiatives that currently

exist. Goebel (2001: 378) states “priority must be given according to the degree of deterioration threatening the survival of a musical work”. The problem with this form of preservation is that institutes are constantly trying to catch up with the past rather than finding ways of preventing problems that might occur in the future.

7.1.2 Examples of archival initiatives

Many institutes have been battling with the prospect of losing artistic works for over fifty years. The preservation and conservation²⁶⁸ of acousmatic music occurred before much awareness had been raised within other areas of electroacoustic music archiving. The GRM, who is host to over 1500 works spanning more half a century, migrated many of their early works from disc to tape (Teruggi 2004: 56), to ensure the preservation on a new, more durable media (one which, at the time, was believed to have a long life expectancy). Bayle was committed to the preservation of acousmatic music and developed many initiatives within the GRM, such as conservation, developing a large CD collection and organising public conferences and listening events to explain and make available the history and works of the GRM in order to establish and maintain its legacy²⁶⁹ (Teruggi 2004: 56). Works on tape were then migrated to digital formats once the degradation of the medium was understood; highlighting that conservation was not an option.

²⁶⁸ The difference between *to conserve* and *to preserve* is an important distinction to make. *To conserve* implies that a work is maintained within its original form. This is not the case if one were to migrate the work to another format because of preservation issues.

²⁶⁹ The *Acousmathèque* was opened in 1993 (<http://www.inagrm.com/historique>) and housed 1500 works composed since 1948.

Recently there has been a large amount of activity in the preservation of digital objects, not just in music, but in science and cultural areas as well. A number of projects have arisen to tackle the complex problem of digital preservation. One of these projects is CASPAR²⁷⁰.

The framework of the CASPAR project is designed around the OAIS model (OAIS reference model 2002). This model is a generalised framework for the long-term preservation of complex digital objects. The idea can be split into three parts: ingestion of data objects into an OAIS repository, access to objects by a community and preservation strategies for these data objects. Figure 38 shows a graphical example of this process as outlined within the OAIS model.

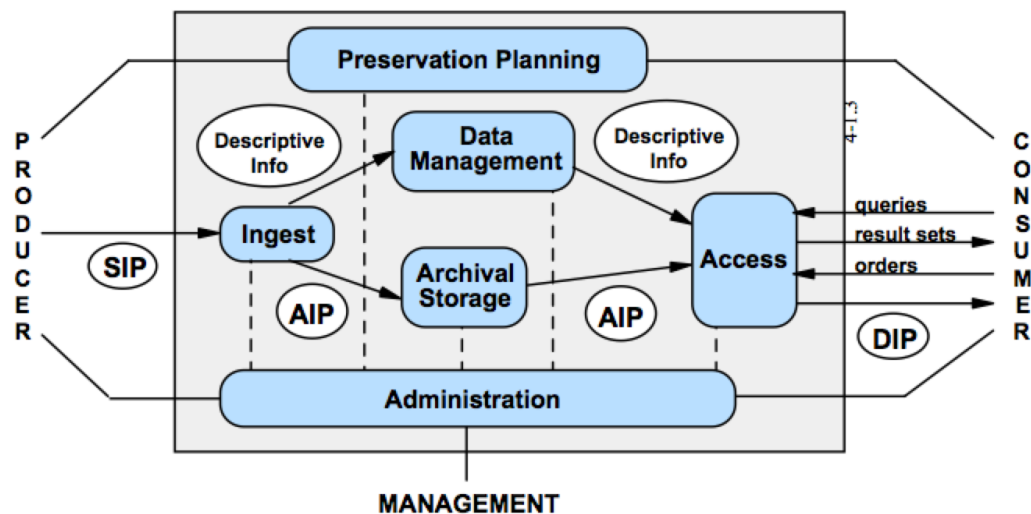


Figure 38. Shows functionality of OAIS entities (taken from *OAIS reference model* (2002)).

²⁷⁰ <http://www.casparpreserves.eu/>

Stated simply, an information package is ingested and validated into the archive system. Once within the system the data is preserved through the preservation planning and maintained by an administrator. A user can access and search through this data through queries, results and orders. More information is added along with the data object to ensure the object, and its associated knowledge, is preserved as time passes.

The packaging information is split into two types of information: the content information (which is the information object being ingested into the repository and its accompanying representation information) and its Preservation Description Information (PDI). The representation information, which accompanies the data object within the content information, is used to provide the user with the necessary information to understand a data object. The PDI is the information that ensures the data object and its representation information stability as time and technology advances. It is split into four parts: provenance, context, reference and fixity information. *Reference Information* can be considered the unique identifier, used to separate digital data objects within the system. *Provenance Information* is used to describe “the history and origin of the archived object” (Factor 2007: 14), providing information in changes and past preservation methods undertaken. *Context Information* provides a “hierarchical structure of a digital archive” (Factor 2007: 14) showing how data objects interrelate. *Fixity Information* is used to make sure that

digital information is authentic and prevents undocumented alteration.

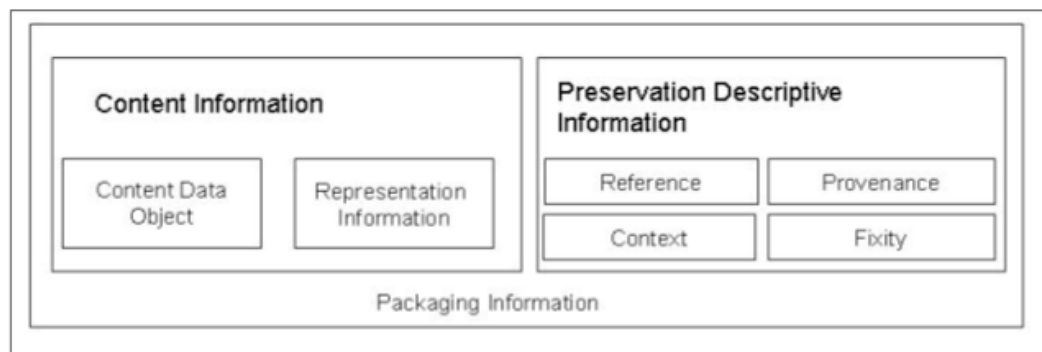


Figure 39. Shows components for an Archival Information Package (taken from Factor 2007: 15).

It might soon become apparent that if one is using digital data to reference and preserve the knowledge of an information object then this information will also need to be preserved in a similar manner. To prevent an overflow of data the OAIS model introduces the idea of a designated community that will ensure the packing information is correct and valid. This is a community of users who maintain and, of course, add to a knowledge base of a specific domain that the data object falls within. Their role within projects such as CASPAR is to be active users of the repository whilst ensuring the knowledge of specific fields (surrounding the objects that are being preserved) is maintained over time.

7.1.3 Integration within the OREMA project

Considering the necessity of a community in the digital preservation of electroacoustic music, using the OAIS model, one can start to comprehend how

such initiatives could work in parallel with other community projects such as OREMA. Figure 40 takes Figure 28 from section 6.2.5 and adds an archive component to the diagram.

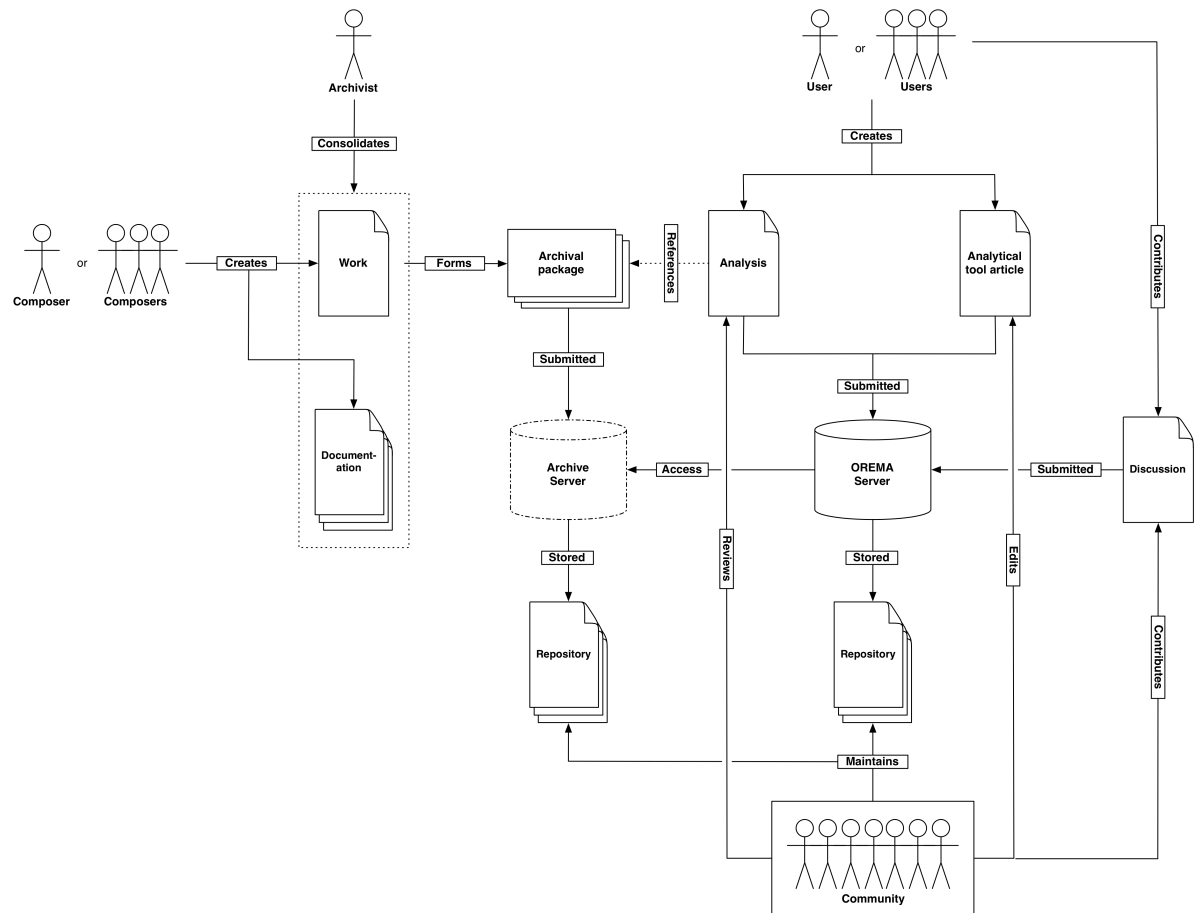


Figure 40. Archival integration into the OREMA project.

Of course the composer(s) and archivist can also be members of the community, but have been separated within the diagram above for clarity. It is the job of the community to not only preserve the works, but also the associated knowledge of

the works as well, something that analysis could certainly aid with.

It is also important to state that the user(s) undertaking an analysis do not necessarily need to use the archived information relating to the poeisis of the work and indeed focus on their individual and unique perspective. Having access to this material provides the opportunity, which would otherwise not be available to users who were not part of the community. This might have the effect of encouraging commitment from users to not only undertake and share analyses, but also to help in preserving the works one might be referencing.

7.2 The liberation of sound analysis

In 1966 Edgard Varèse wrote *The Liberation of Sound* in which he spoke of “[his] fight for the liberation of sound and for [his/our] right to make music with any sound and all sounds [...]” (Varèse 1966: 14). At the time of the article he wrote, “composers are now able, as never before, to satisfy the dictates of that inner ear of the imagination” (Varèse 1966: 18), referring to music as simply “organised sound” (Varèse 1966: 18). Arguably this wealth of musical possibilities has only expanded with the advances in technology since this article, creating more potential categories of electroacoustic music and freeing the composer’s inner ear even more. What Varèse foresaw was the potential future for music in which any conceivable sound could be created. Where its limitations were only defined by the imagination of the composer and not by the instruments at his or her disposal. With the advent of electroacoustic music and the many categories mentioned throughout this thesis²⁷¹ it could be argued that this vision has become a reality. Composers are no longer dependent on solely an instrument’s capability and can imagine their musical ideas through the manipulation of recorded sounds or through the synthesis of new ones. In effect the computer has not only become an instrument, but also a means of planning and realising a work as well. The computer within music has not only expanded the potential sounds one might use, but also the means with which a composer might present his or her work, be it a fixed media,

²⁷¹ Acousmatic music, mixed music, audiovisual works and sonic installations to name but a few.

performance or open form piece. The liberation of sound has now transpired to be the liberation of music with the emergence of what could be termed a 'limitless' work²⁷². However, in order for such a radical change in traditions a new culture was needed to embrace these new possibilities. The initial work by Schaeffer and other subsequent scholars was partly a way to validate this new culture and attitude towards sounds and their potential use within compositions. This thesis, through the creation of the electroacoustic toolbox and the application of the analytical community, has argued for the same liberation for the analysis of such 'limitless' works. Much like the advent of electroacoustic music itself a new culture is needed in order to achieve this.

Three main strands were devised to promote the concept of a new culture for electroacoustic music analysis. The first of these aspects was to set the foundations of this new culture through the theory of an analysis as a perspective. The second was to produce a range of flexible criteria to assess the scope of the current and future analytical tools, whilst also providing terminology that could be applied as identifiers to compartmentalise an electroacoustic work without limiting it to a single formalised perspective or procedure. Finally, the concept of the analytical community platform, in which this culture could exist and advance, was investigated and tested with the creation of the OREMA project.

²⁷² Works not bound by preconceived notions, based on Western music traditions (or others), of what constitutes music.

7.2.1 Concept of electroacoustic music as presented within this thesis

Freedom to express one's own understanding of a work that is not constrained to only a few formalised analytical methodologies is a fundamental aspect of this thesis, which has resonances within both the electroacoustic toolbox and the concept of the analytical community. Instead the concept of unique perspectives is outlined throughout, but particularly focused upon within chapter 3 where the concept of the authentic subjective (imperfect) analysis was introduced. The argument proposed is that analysis is not merely a formulaic process; rather it can be a form of expression. A unique perspective that is infused with the idiosyncrasies of its creator, not bound by a regimented formalised approach that views all works with the same process. By not limiting oneself to a few analytical procedures an analyst can realise his/her perspective any way they wish. This standpoint echoes Nattiez's (1990: 168) comment that there is "never only one valid musical analysis of a given work". This approach also gives rise to other methods of analysis that concern meaning and not just those that concern a work's perceptual qualities. However, it should be stated that the concept of an authentic subjective analysis does not negate the possible usefulness of formalised analysis²⁷³, rather that the scope of such analytical procedures should be focused on the individual pertinent aspects of the categories of electroacoustic music they

²⁷³ Indeed the analyst will have to apply the formalised analytical tool, which would require their own personal perception of the work, which might differ from other analysts using the same tool.

are investigating (as opposed to their use within instrumental music that tends to focus on pitch, melody and rhythm²⁷⁴). The importance of an authentic subjective analysis is that the purpose originates from the analyst's aim to communicate his or her unique perspective of a work and is not presupposed by the limited array of analytical tools at their disposal. Once they have a reason and aim for an analytical investigation they can then decide which methodology and tool is most applicable to effectively communicate their perspective. This is when the analyst might choose to use the electroacoustic toolbox to best find an analytical tool that best suits his or her needs.

Although the concept of analysis was challenged throughout this thesis the notion of *analysis* as a procedure was kept intact. The process of *to question* – *to investigate* – *to form coherence* was presented as a means to promote focus, but at the same time to ensure the analyst was free to undertake an analysis anyway they saw fit. Each of these stages of the investigation highlights potential difficulties, specifically concerning: the objectives of study; the object of study; and the reception of the final analysis. The first stage, *to question*, is the most fundamental, as it dictates the scope of the analytical investigation. Most importantly, it is at this stage that the analyst must decide what the relevant

²⁷⁴ For example, it would not be beneficial to apply a formalised analysis that focuses on pitch elements within some acousmatic works where pitch is not a defining element within its composition. In these instances it would be more beneficial to investigate other elements, such as timbre and spatiality that might have more relevance to an acousmatic work.

aspects of the work are and which ones will not be focused upon. In doing so the analyst begins to reduce the eventual perspective in order to satisfy the original aim, or indeed the objective(s) of study. Therefore, the end result will be one single perspective of a work, defined by the original question that the analyst proposed. This hopefully results in numerous authentic subjective analyses of the same work by different analysts²⁷⁵ all providing unique perspectives of a piece rather than claiming their analysis is the only relevant one.

The *to investigate* stage of the analytical process is of particular importance as it highlights one of the fundamental questions regarding electroacoustic music analysis: what is the object of study? For electroacoustic music this thesis has argued that some fixity is required, not only for the purposes of the analysis, but in order to communicate effectively the materials he or she has focused upon within the analytical investigation. This fixity would either be based on a recording of the music or event (in which the analyst would focus upon the musical pertinences), or a document of the work, be it a score or description of the experience (where the analyst would investigate notable aspects)²⁷⁶. Its importance for electroacoustic music analysis should not be overlooked, as the musical object of study should always be the focus for any analytical investigation into a work. However, in some cases having an accurate exemplar of the musical material of a work is not always

²⁷⁵ Or many analyses of the same work from different perspectives by the same analyst.

²⁷⁶ All highlighted in figure 8.

possible. In these cases (and depending on the analytical aims) it might be pertinent to find another means of documenting the work, such as a written account of one's experience. The flexibility to choose from a number of different objects of study means that all of the categories of electroacoustic music can be investigated, regardless of their format and presentation. This choice of the object of study is one that can be made after determining the aims of the investigation, since this is when the analyst defines its scope. Therefore, the relevant features of the work in question need to be present within either the musical pertinences or the notable features of the chosen object of study. That said it is entirely plausible that the limitations of the object of study might indeed define the scope of the investigation, although it is preferable that the analytical purpose is defined by the intentions of the analyst. In fact the most relevant object of study should be sought once the analytical aims are defined, rather than defining the investigation on its limitations.

Finally the format and the reception of the analysis fall within the final stage of the analytical process – *to form coherence*. If an analysis is a perspective of a work then the form in which it takes is the means to communicate this perspective. It is at this stage that the analyst can be creative in expressing their perspective of a work in whatever way they deem fit²⁷⁷. If one is referring to the liberation of sound analysis it is within the outcomes of such investigations where this liberation will be

²⁷⁷ Many examples of the different outcomes of an analysis have been described throughout this thesis, particularly within section 2.4.

present. It is entirely possible to imagine analyses that use multimedia and interaction, much like the examples of Clarke's (2010) interactive aural analysis but with open form electroacoustic works, such as installations, where a user might explore the work and engage with it like they might if they were actually experiencing it²⁷⁸.

7.2.2 Critique of the electroacoustic toolbox

The application of the toolbox, both as a means to cross-examine the current analytical tools and as a set of identifiers, provide many challenges for potential users. Focusing first on the cross-examination of analytical tools an analyst might be confused that the toolbox appears to prescribe a certain methodology. However, its role is to recommend certain tools that focus on the particular analytical intentions of the analyst, not to determine their investigation (as outlined in the process for analysis). The main challenge for many users is first of all to understand the limitations of the toolbox and its intended use. The toolbox segments the musical experience into discrete sections using terminology that relates to the potential pertinent features of an object of study²⁷⁹, which an analytical tool might usefully investigate. Although the terminology used is intended to be universal (within the domain of electroacoustic music) there is of course room

²⁷⁸ This would be especially useful for installations that use audience participation and interaction as a fundamental part of the musical creation and experience.

²⁷⁹ Although these will certainly differ between different musical works and of course the different perspectives of the analysts.

for interpretation in both applying them to an analytical tool and as identifiers to compartmentalise a work. Attempts have been made to ensure that the cross-examination of tools is as clear as possible, but there is certainly room to contend the extent to which a tool covers a particular criterion even with the scoring system²⁸⁰, especially when defining the comprehensiveness of tools that cover the same criterion in different ways. For example, the use of general criteria within the toolbox means that any subtleties between tools that cover the same criteria cannot be communicated. Therefore, the toolbox is only a guide, intended to centralise the analytical tools available together so that an analyst might quickly reference which one might be the most suitable. It may transpire that the theoretically correct analytical tool, according to the electroacoustic toolbox, does not in fact analyse effectively the object of study. Hence, the analyst will always have to consider, before beginning the *to investigate* stage of the analytical process, whether the highlighted tools not only cover the potential subtleties of the criteria required, but also the effectiveness of the tools' analytical outcome in communicating their intended perspective (i.e. written, visual or multimedia).

Defining the optimum choice in choosing a tool is a challenge. Depending on the intentions of the investigation an analyst might decide a universal approach to a work (one which covers many pertinent features of an object of study rather than a

²⁸⁰ As outlined in section 4.1.5.1.

select few) is more appropriate to their aims. As documented within this thesis there are tools that do cover a vast area of criteria, but at the expense of depth²⁸¹. However, this might not be a problem, provided the analytical tool investigates the relevant criteria and communicates the analyst's perspective effectively. The fundamental question, for either an analyst or a scholar developing an analytical tool, is whether the intended investigation is specialist or universal. One is not suggesting that there is indeed an optimum choice between the two, or that there should even be one, rather the analyst should express their understanding of the work however they see fit, be it an in-depth investigation of a particular element of a work, or a consideration of many components that might rest within (or indeed outside) the object of study.

The criteria, if used as identifiers, are the first stage of the atomisation of a musical work into compartmental pieces. When experiencing the work within the temporal flux these elements are indivisible and are only separated here for the purposes of beginning an analysis. These criteria do not analyse or define these elements within a work anymore than simply to determine their existence. To establish that a sound is a sonic entity is to simply pinpoint it within the work, which does not determine its characteristics or differentiate from others even though they might be entirely different perceptually. An analytical tool is required to ascertain the

²⁸¹ Giomi and Ligabue's *Aesthetic-Cognitive Analysis* (1998) is one example of this.

differences and significance of such elements and the electroacoustic toolbox, when used to cross-examine analytical tools, can aid the analyst in finding the most appropriate tool(s).

When applied as identifiers the toolbox criteria are not meant to dictate any predetermined perspective on a work and are intended to allow for many different understandings of the material. But, in identifying elements within a work (perceptually or with the aesthetic experience criteria), one can begin to form an opinion of its significance within a work. That is the importance of the criteria as identifiers, not as a means to segment the work, rather a method to identify pertinent elements without predetermining their nature. From there an analyst can adopt his or her own preferred perspective and determine which analytical tool best suits their analytical agenda. Thus once the pertinent elements within a work have been defined the analyst can begin to determine which analytical tool would be appropriate for the piece and their analytical intentions.

The criteria within the perceptual framework are intended to be as intuitive as possible for both the professional analyst and the general reader²⁸². By allowing for some freedom in the differences between for example gestalt units and event relationships the perceptual framework accounts for the potentially different

²⁸² Although there might be some confusion between terms such as *timbre* and *spectrum* as already discussed within this thesis.

apprehensions of materials by different analysts²⁸³ investigating the same work. Again, this is intended to ensure that the analyst is not limited in the way they might express their understanding and how their perception might change.

The sound event criteria (found within both the sonic entities and gestalt units subsections) are entirely focused on perceptual qualities, almost to the extent where it could be argued to be a reduced listening approach. Because of this any of the interpretations and meanings that might arise from a sound event are investigated through the aesthetic experience criteria (specifically the *reference* and expression criteria set). Although listeners do not separate perception and meaning within the listening flux it is a fundamental part of the electroacoustic toolbox to atomise an object of study to effectively highlight which tools cover certain criteria.

Both the meaningful units and form categories could be considered within the same instance here as their individual criteria are not considered constituent for that level²⁸⁴. Instead the musical structures within the meaningful units, when reduced to its core, have to be either horizontal or vertical relationships between sound events or structures, or indeed both. Ultimately culminating in the overall form

²⁸³ Or the same analyst between different listenings.

²⁸⁴ Unlike sound event criteria, which due to perceptual binding (Snyder 2000: 20), cannot be separated entirely from the individual event itself.

where one might comment on a piece's shape, classification or compositional style²⁸⁵. Categories such as *rhetoric* and *movements* are perhaps the most vague within the toolbox, as they need to account for the different compositional styles between categories of electroacoustic music and between different composers as well. If one were to make an acousmatic toolbox for example (or any other toolbox specialising in a particular electroacoustic music category) then these are the two criteria that would need to be expanded upon. As it stands the electroacoustic toolbox is intended to be all embracing in its scope whilst not predetermining how an analyst should view a work. When one begins to include specialist criteria specific to a single category of electroacoustic music one would most certainly begin to decrease a toolbox's scope, potentially limiting the ways in which an analyst might form a perspective of a work when using it.

As previously stated in section 4.1.3 the terms used within the aesthetic experience framework borrow heavily from Smalley's writings on source bonding (1994), surrogacy (1997) and indicative fields (1996). The terms used within the toolbox have been appropriated and unapologetically taken out of their initial context in order to fill a particular role. Within Smalley's publications these terms are complex in nature and often require knowledge of his other concepts to be fully understood.

²⁸⁵ The answers to which are often found within the meaningful units and their relations to one another.

However, their application within the toolbox is as criteria that are (relatively) readily understandable to most people²⁸⁶.

In the case of the electroacoustic toolbox the terms are split between two areas of the aesthetic experience: reference and expression. The reference criteria are perhaps the most diverse and span many of Smalley's publications. Indeed the concept of *surrogacy* is much more complex than stated within the thesis. For example, Smalley's (1997: 112) concept of second order surrogacy deals with sounds that are instrumental in nature, where "recognised performance skills" are used to "develop an extensive registral articulatory play". This, it could be argued, has more relevance to the concept of *expression* (particularly the gesture criteria) within the toolbox than that of the *reference* section. In fact this is a prime example of how many of Smalley's terms are indivisible and require the reader to have knowledge of all his writings. However, his writings on surrogacy do not include the concept of utterance, even though Smalley (1993: 525) considers it to be the "essential vehicle of personal expression and communication".

The concept of transcontextuality is perhaps one of the most appropriated terms taken from Smalley's writings. Used within the toolbox it focuses mostly on the

²⁸⁶ There are however some exceptions, such as transcontextuality (since the word was appropriated by Smalley), that are certainly not comprehensible to many readers who are unaware of Smalley's publications.

apprehension of the significance of the sound(s) rather than its potential emotional impact on the listener. The emotional impact is of specific importance for Smalley (1996: 99) as it might take the form of a “critical commentary, whether serious or ironic, social or political”. This is touched upon within the toolbox, but only to the extent that it is an outcome of understanding the referential characteristics of the sound.

The *expression* criteria concentrate on sounds that are inherently expressive in their form, through their relation to human intervention. Therefore, the potential referential aspects (along with the potential associated interpretations the knowledge of the origin of the sounds might evoke) are not part of this section of the aesthetic experience. In understanding a sound origin one might begin to understand its cultural significance, which might be played upon by the composer within the work. That said a sound might have an emotional impact on a listener through its spectromorphological characteristics, as discussed above. Again the toolbox criteria allows for these differences when, for example, a bell resonance might have cultural significance to one listener (which would be understood as a transcontextual element within a work), whilst another listener, who might not have knowledge of the sound’s cultural significance, might concentrate on the

expressive nature of the sound as a gesture²⁸⁷. So, similar to the subtle differences between a gestalt unit and an event structure within the perceptual framework of the toolbox the aesthetic experience criteria account for these two potential understandings of a sound, thus allowing for two separate perspectives.

7.2.3 Critique of the analyses undertaken

Four works were analysed within this thesis²⁸⁸ to test the concepts raised for this new culture for analysis, particularly the process as outlined in chapter 3 and the electroacoustic toolbox from chapter 4. The majority of pieces chosen are acousmatic works, the one exception was Neuhaus's *Times Square* installation, which could be argued was acousmatic in nature²⁸⁹. The reason for this constraint was to ensure that both the process of analysis and the electroacoustic toolbox could affectively be applied and explained in more detail beyond the example given with Denis Smalley's *Wind Chimes* (1987) in section 4.2.2.

Each analysis applied the process for analysis (as outlined in section 3.1.3) within its investigation. This is particularly evident as each introduction explains the reasons and aims for undertaking the analysis, satisfying the *to question* stage of

²⁸⁷ Indeed a bell sound might also conjure a general transcontextual understanding of religious significance regardless of the particular bell's importance.

²⁸⁸ Pierre Schaeffer's *Étude aux chemins de fer* (1948); François Bayle's *Toupie dans le ciel* (1979); Max Neuhaus's *Times Square* (1977); and Trevor Wishart's *Imago* (2002).

²⁸⁹ The sound source within this installation emanates from underneath a grate and is hidden from the potential (unknowing) audience who might assume that it is a part of the urban soundscape.

the process. In doing so the method of the analytical investigation was planned in advance, particularly when concerning the scope and the relevant pertinent features of the chosen objects of study. The reasons and aims of the analysis dictated, to some extent, which analytical tool or methodology should be applied to achieve the intended outcome. Clearly, as the analyst, I had to use my own intuition when using the electroacoustic toolbox to cross-examine the tools available to ensure that they did in fact cover exactly what I wanted to achieve. By having clear aims I was able to discern which tools were valuable, rather than assuming any tool that covered the criteria I was focusing upon would indeed be suitable.

The analyses demonstrate a wide range of methodologies and applications of different analytical tools. Some were more formalised in nature, particularly that which applied the typo-morphology framework to *Étude aux chemins de fer*, whilst others followed a non-formalised approach, such as the phenomenological analysis of *Toupie dans le ciel*, allowed me to be much more expressive in my understanding of the work²⁹⁰. In the case of the analysis of *Étude aux chemins de fer* it was the application of a tool that was the purpose of the investigation and the work was chosen to test its implementation. In this instance the object of study was

²⁹⁰ That said I still had to interpret and perceive the typology and morphology of the sounds within *Étude aux chemins de fer*, which would likely be interpreted differently by another analyst.

still the work being investigated, but an additional objective of the investigation was to interrogate the analytical tool (typo-morphology) as well.

Three of the four analyses were esthetic in nature; however, the analysis of Wishart's *Imago* permitted (and indeed encouraged) the use of the composition notes within the analysis, focusing on whether the poietic elements of the work were identifiable within its structure after applying Roy's *grille fonctionnelle*. This analysis was of particular importance since it demonstrated that even though I had access to the compositional notes I still had the opportunity to express my perspective of the work, particularly when I chose not to follow Wishart's intentions for how the piece was structured²⁹¹. This analysis also was an example of how poietic information could benefit an analysis that required such information to achieve its aims (and not to dictate them). Finally, this implementation demonstrated the potential usefulness of analysts and musicologists having access to poietic information within an archive as outlined in the postscript (section 7.1).

The analysis of Neuhaus's *Times Square* highlighted the potential problems concerning the object of study for some electroacoustic music categories. Whereas the other works analysed were based on fixed media *Times Square* is an open form site-specific work, meaning that it had to be directly experienced. Since I

²⁹¹ This was especially evident when I disagreed with the significance of the *dipper* sound as an indicator of change within the work (section 5.5.2.1).

could not accurately replicate the work I decided to write a monologue that recounted my experience of it, which acted as the object of study, whilst referring to videos of the work for further context. Although this object of study did fit my analytical aims (which were to investigate the possibility of using a written description of the work as the object of study) I would have been somewhat at a disadvantage if I were, for example, attempting to investigate the sound of the installation in great detail²⁹². There are certainly other ways in which fixity could be achieved to capture the sound, but these will never fully encapsulate the true experience of witnessing the work first hand, or indeed accidentally discovering or ignoring it. For other installations that are meant to be perceptible within an environment this might not pose such a problem, as the discovery of the installation does not play a fundamental role in the work's experience. In these instances an analyst might want to record as much information as possible (musical, visual etc.) depending on the structure and, of course, the aims of the subsequent analytical investigation.

All the analyses produced different outcomes. This was intentional to demonstrate the different possible perspectives one analyst might take on different works. The importance of this cannot be overlooked; particularly with the analyses of both

²⁹² My analysis of the sound of Times Square (in section 5.4.2.3) was conducted using videos of the work. If I were to investigate this aspect of the work in greater detail I would need to find a means of capturing the sound without the background urban soundscape of Times Square, to consider it on its own (as the work is site-specific the sound from the urban environment is also important, but could be separated in order to investigate these two soundscapes individually).

Étude aux chemins de fer and *Imago*, which both had elements of formalised notation involved (in their transcription). As previously mentioned above, the application of both typo-morphology to *Étude aux chemins de fer* and the *grille fonctionnelle* to *Imago* were both based on my perceptual understandings of the works. Another analyst with the same aims and using the same analytical tools might come to a completely different outcome. Furthermore, in applying these particular analytical tools the scope and the outcome of the analytical investigation was defined²⁹³. The concessions made to ignore some elements were understood and accepted from the beginning of each analysis before the analytical investigation took place. By focusing on a particular aim and on relevant pertinent features of the work the outcomes of the analyses could be effectively communicated to the reader; hence the *to form coherence* aim to the process of analysis was satisfied.

Throughout the work I employed the toolbox criteria (in particular the perceptual framework criteria) to discuss elements within the works²⁹⁴. These terms were not meant to evoke a specific analytical bias, rather to identify elements of interest in

²⁹³ This was apparent with the application of typo-morphology on *Étude aux chemins de fer*, as this analytical tool could not investigate the potential structure relationships, especially the complex surrealist compositional structures as mentioned in section 5.2.3.

²⁹⁴ However, there were occasions where the terminology within a particular tool took precedent over the criteria within the toolbox to avoid any confusion between terms (this is evident within phenomenological the analysis of *Toupie dans le ciel*).

order to investigate them in more detail, usually with the aid of a chosen analytical tool.

7.2.4 Critique of the analytical community and the OREMA project

In order to create an environment for this new culture and to document and distribute its findings, a concept for a new platform – the analytical community – was devised and implemented. This was named the Online Repository for Electroacoustic Music Analysis (OREMA) project. Whereas the concept of electroacoustic music analysis (including the process for analysis) and the electroacoustic toolbox contributed to the foundations of this new culture the analytical community concept outlined a platform in which they could be realised. The OREMA project was an attempt to test the validity of this proposed culture and to evaluate whether it could be grown organically. It was for this reason that the concepts outlined within both chapter 3 (the concept of electroacoustic music analysis as defined within this thesis and its process) and chapter 4 (the electroacoustic toolbox) were not introduced to the participants. Instead the scope of the project was simply to share analyses of electroacoustic musical works (in the broadest sense) with other practitioners²⁹⁵ and to discuss analytical methodologies and strategies. At its core it did allow for multiple analyses, but did not prevent

²⁹⁵ The concept was to embrace the potential different perspectives, especially those that challenged a consensus for how a work should be understood. By doing so a reader could gain an understanding of the many different ways a single work might be perceived.

contributors submitting any analyses of electroacoustic works (unless it was their own composition)²⁹⁶. Much like Varèse's envisagement of a machine that would faithfully reproduce any and all sounds conceivable (1966: 12) the OREMA project platform allows for any and all conceivable analyses to be presented to an international audience. The participants were allowed (and indeed encouraged) to communicate their understandings of a work anyway they saw fit, which produced some interesting results with some participants developing their own methodologies, or applying concepts from other domains not previously explored in electroacoustic music analysis²⁹⁷.

The analytical community concept is fundamental to the new culture proposed as it provides a platform for it to exist, grow and communicate. There are no barriers of entry for contributors to share their perspectives on the core OREMA website, but for those who wish for their contributions to be peer reviewed there is the eOREMA journal (which is also free to submit and access the content). This form of publication (specific to the analysis of electroacoustic music) has never existed before and provides a complementary contrast to the other ways of distributing such information within the electroacoustic community and could certainly be expanded to other fields within electroacoustic music research.

²⁹⁶ The focus on particular works within the beta stage of the project was not meant to limit the contributions, but to provide a focus for the initial participants and to gather different perspectives on the same piece to demonstrate to potential participants that this was indeed acceptable.

²⁹⁷ One example of this is Constantinou's analysis of *Dripsody*.

There are wider implications to analysis than simply providing a perspective on a work. Analysis as an activity is a fundamental part of the electroacoustic music research that is severely lacking. It should not just be an activity of a select few who wish to communicate these perspectives to one another, but should impact on other fields such as composition and pedagogy. Musicologists must become a fundamental part of the electroacoustic community, communicating, influencing and most importantly allowing other areas to influence their study. The relationship between all the fields within electroacoustic music research should be a symbiotic one, not segmented entirely; just enough to allow for diversity of opinion (Surowiecki 2004: 10). The community needs to be strong to ensure the long-term survival of this art form, which not only requires the preservation of the works themselves, but also the knowledge surrounding them. In all cases a community needs to be formed to produce, perform and understand in order to protect the music. Analysis is one part of ensuring electroacoustic music's longevity, but it certainly cannot answer all the problems facing the art form now and in years to come.

7.2.5 Why analysis is important?

Analytical and musicological studies could have a major impact on areas such as composition. It was only with the development of musical rhetoric that the idea of *form* entered musical theory (Bent 1980: 343). Again analysis does not intend to

“codify” the music (Varèse 1966: 18), rather allow for a better understanding of how we ‘make sense’ of an electroacoustic work, which could inform our understanding of the rhetoric of particular electroacoustic music categories (set by the composers, not the analysts).

[...] there *is* a reason why traditional composers have evolved in the way they have: they understand composition. At the very least, the composers have something to teach the rest of us about composition. The study of existing music will always repay with dividends the effort expended, even if the music comes from a tradition that seems completely alien (Hugill 2012: 118).

In the process of learning we can begin to better understand how to teach these skills in both creating and understanding. However, such tuition, like analysis, should not be structured to teach the exact principles of the art form, as dictated by a single authority, but to encourage and facilitate the birth of new composers with their own personal compositional rhetoric and analytical perspectives. “It is often considered, and wrongly so, in my opinion, that what we call analysis generates information about doing, whereas in fact it can at best provide information about how to put into form in our consciousness that which we hear, which in turn leads to the perception of the significant component and paves the way to future doing” (Boesch 1996: 229). Thus, through developing concrete analytical strategies, composers could develop an understanding of “his/her musical sensibility and musical materials” through practice (Young 2004: 8).

7.2.6 Potential future initiatives

Section 7.1 outlined the possibility of adding an archival element to the OREMA project; however, this is not the only potential extension that could be built. The OREMA project was the first of its kind and the first community lead initiative in an academic peer-review environment. Decentralisation was a key concept within the project, something that many academics are not accustomed to. OREMA in effect challenged the culture of the electroacoustic community. The OREMA project challenged things in such a way that future work could be built on from this experience. For example, a repository could not only be used for new electroacoustic work, but also new ones. The website could become a sharing platform for completed works, sounds (both untreated and processed), compositional techniques and software. Furthermore, the environment is well suited to the possibility of e-learning; teaching students internationally whilst sharing different cultural perspectives. A young composer could post his or her draft composition work to get feedback from international experts. Much as with OREMA an active and enthusiastic community would be paramount to the success of such an endeavour.

7.3 Final conclusions

All three points of the hypothesis outlined in the abstract (section 1.0) have been addressed. This thesis from the very beginning has argued against the assumption that there is only one “true” analysis of a single work (Nattiez 1990: 168), whether this is based on the composer’s intentions or a musicologist’s perspective. What has been developed is a selection of identifiers within the electroacoustic toolbox which can also be used to cross-examine existing and potential new tools; a number of analyses demonstrating its application (and the application of some of the investigated analytical tools); and the conception and implementation of an analytical community.

“Music in the world survives handily without any help from analysis. Yet no one who wants to understand music deeply can avoid some degree of analytical involvement” (Kramer 2011: 144). This thesis has asserted that analysis is not only lacking within electroacoustic music research, but that it is clearly needed to form a better understanding of this genre. Members of the electroacoustic community do have ideas regarding the analysis of electroacoustic music (as demonstrated within the OREMA project), but they do not see the benefit in devoting time to understanding another composer’s work through such an investigation. We need committed musicologists that are willing to devote their time to the development of

this subject. This will define the areas that need further research²⁹⁸. We need composers to be more open about their compositional methodologies, perhaps documenting their compositional processes as Wishart (2012) has. With knowledge of the compositional process musicologists might be able to start documenting category and composer specific rhetoric, not to codify the music, but to better communicate the compositional methodology to others, perhaps students. Further sound constructs might be defined from sharing different aesthetic perceptions and understandings from different analysts (on platforms such as OREMA). We then need an active reader base that will absorb this information, ensuring the necessity of such work. Basically, the electroacoustic community needs to start working together towards the advancement of electroacoustic music research, rather than concentrating on personal gain and prestige.

There are a number of potential future initiatives that could be pursued following on from the results of this study. There is need for a firmer grounding for an analytical community (much like the OREMA project) that harnesses the potential of web 2.0 technologies to include compositional and e-learning capabilities. This could include many of the concepts outlined in section 7.2.2. Applying more analytical tools to test the toolbox criteria could also develop its terminology further. Finally, the process of analysis could be investigated to a greater extent to uncover how

²⁹⁸ Particularly with regards to the form of electroacoustic music.

the interaction between the readers of a perspective and the author's potential revisions can impact on the analyses of others.

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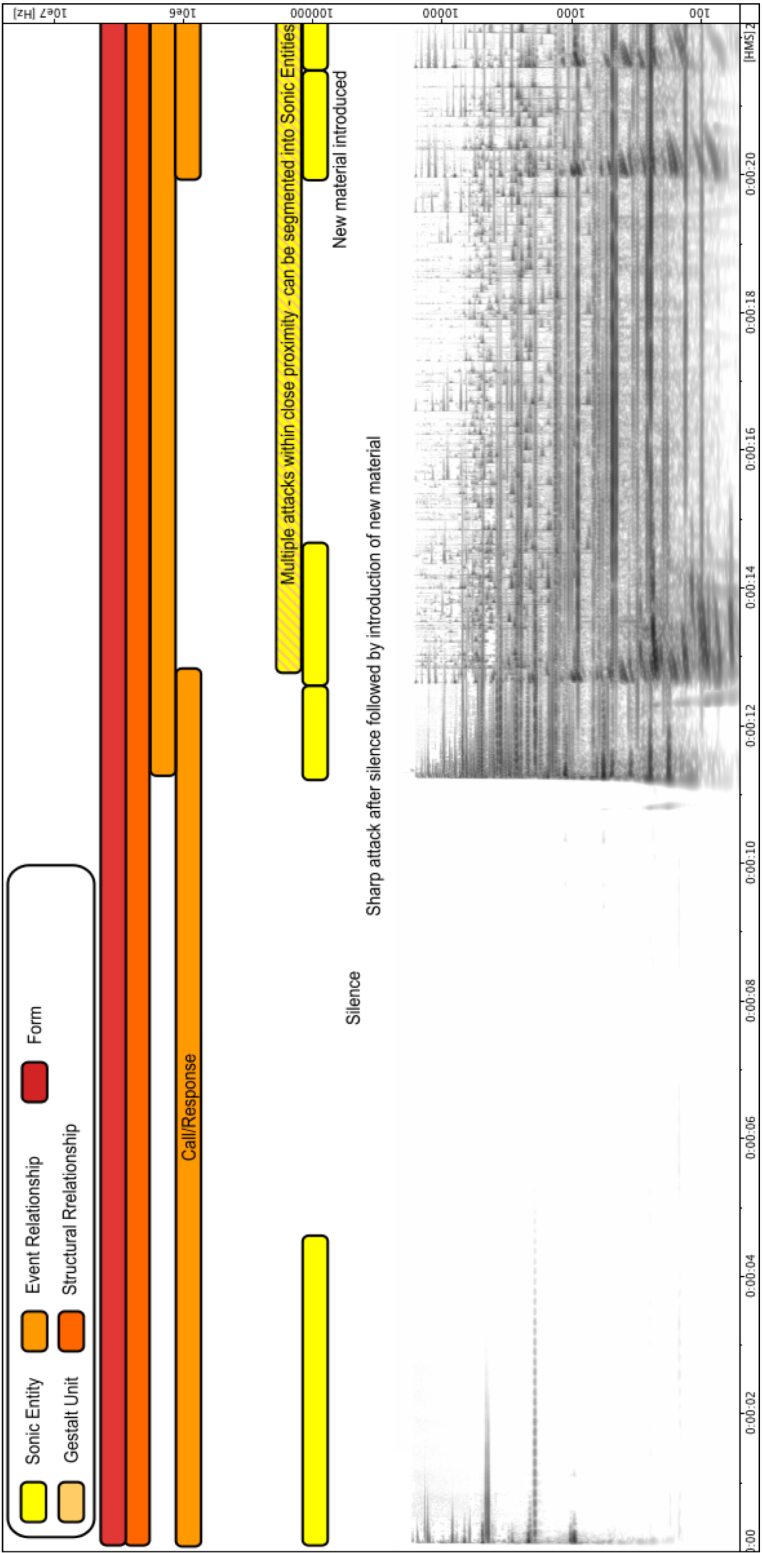
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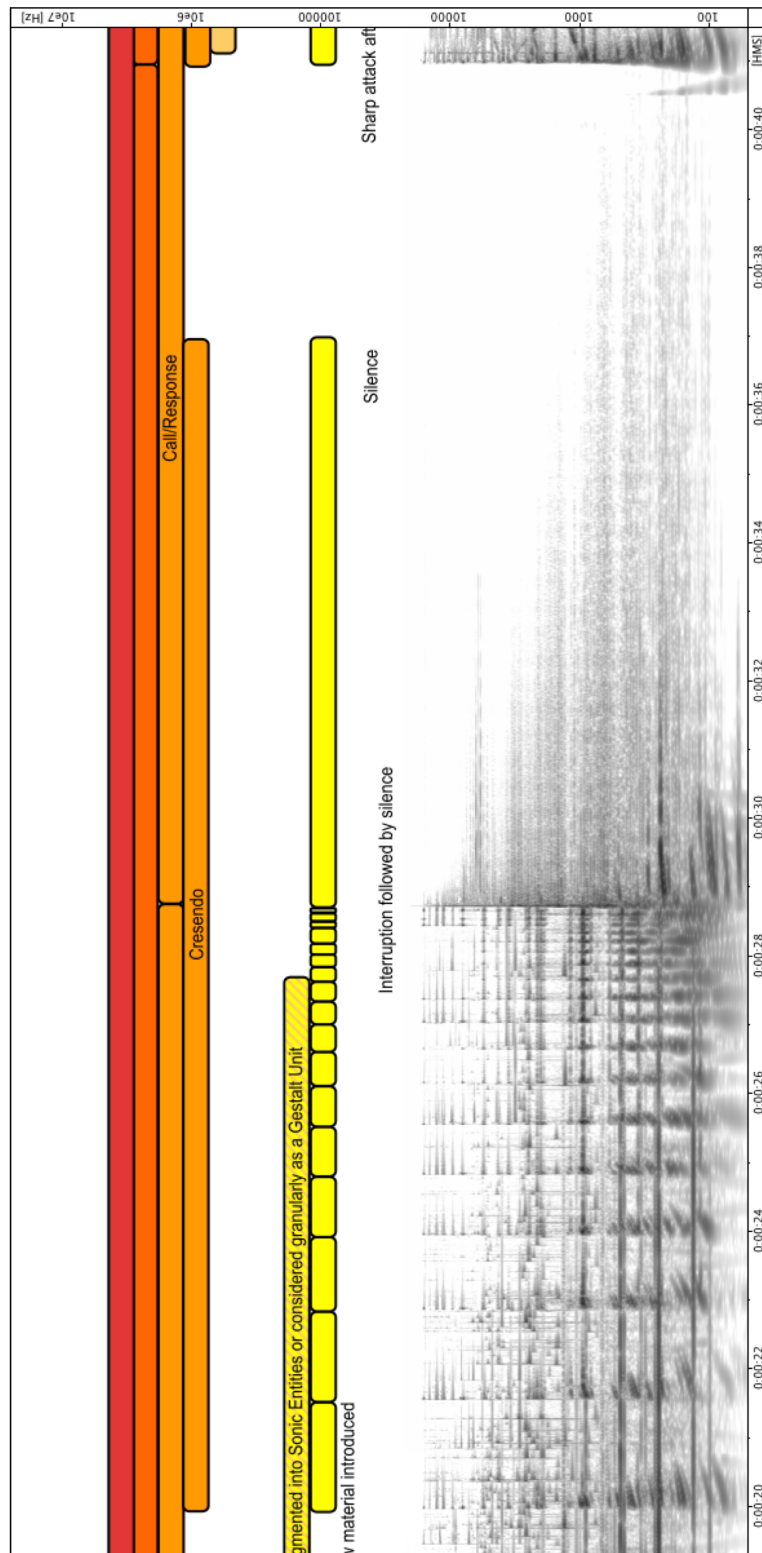
9.0 Appendices

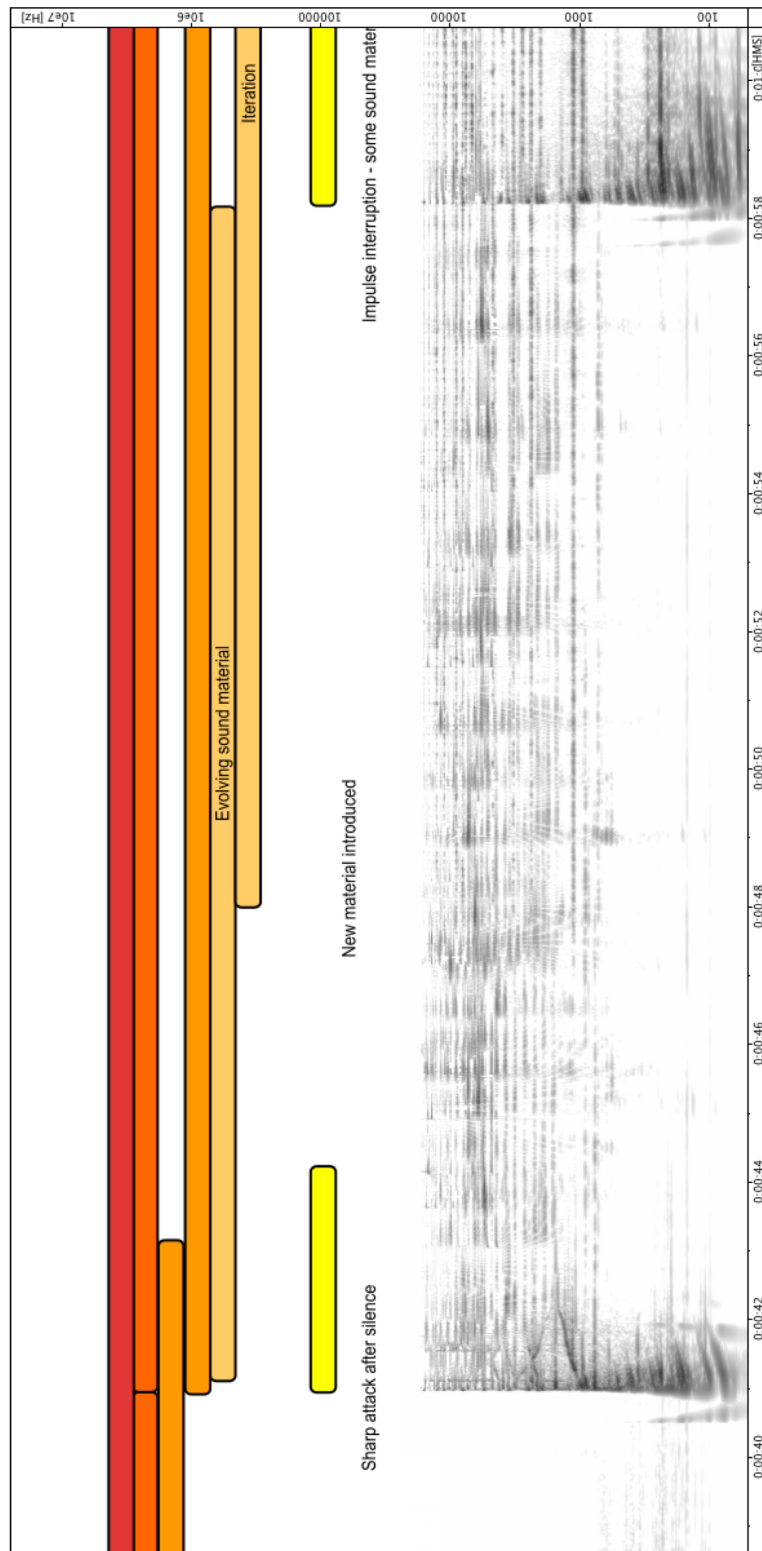
9.1 Appendix 1 – Electroacoustic toolbox table

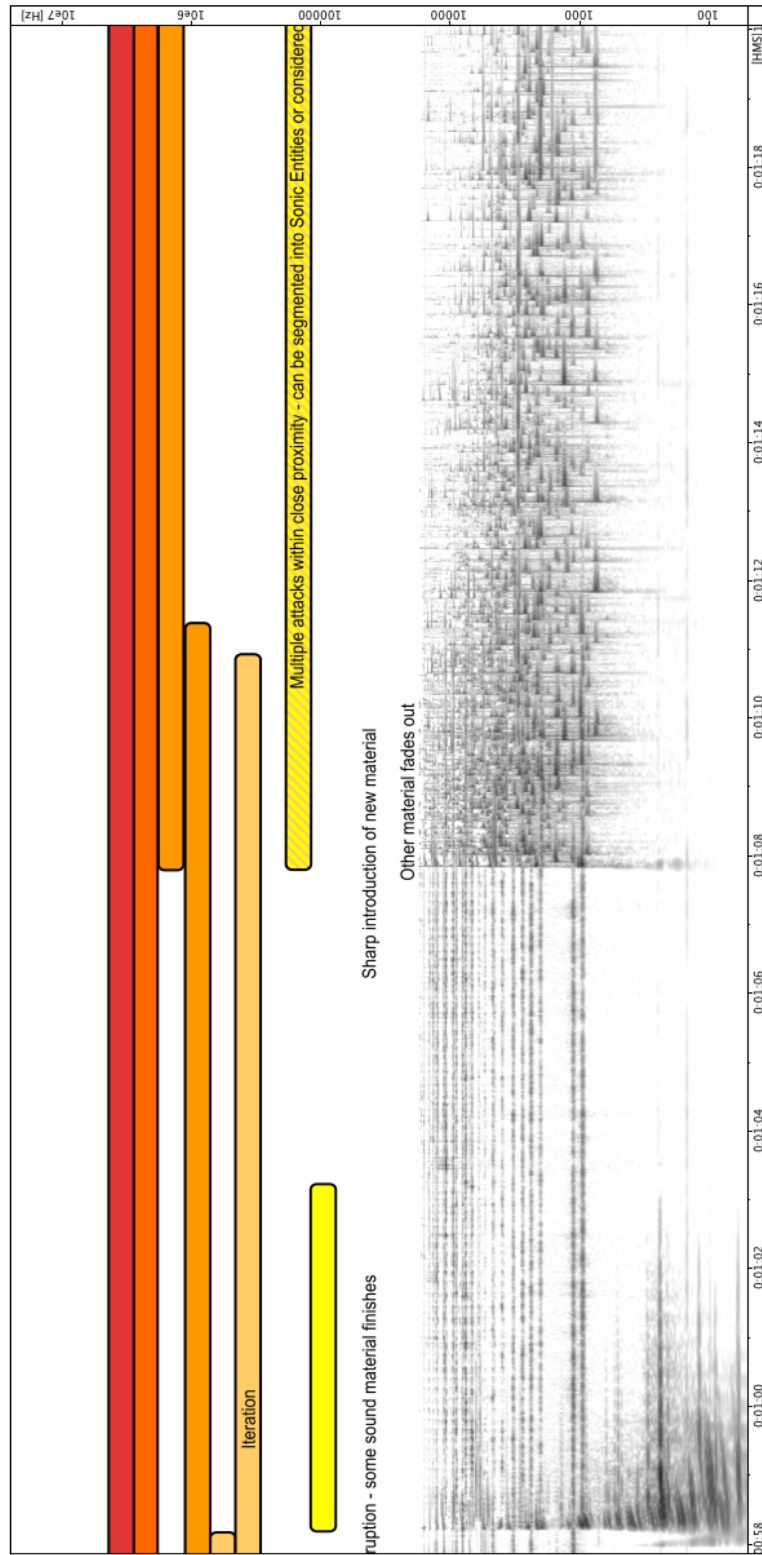
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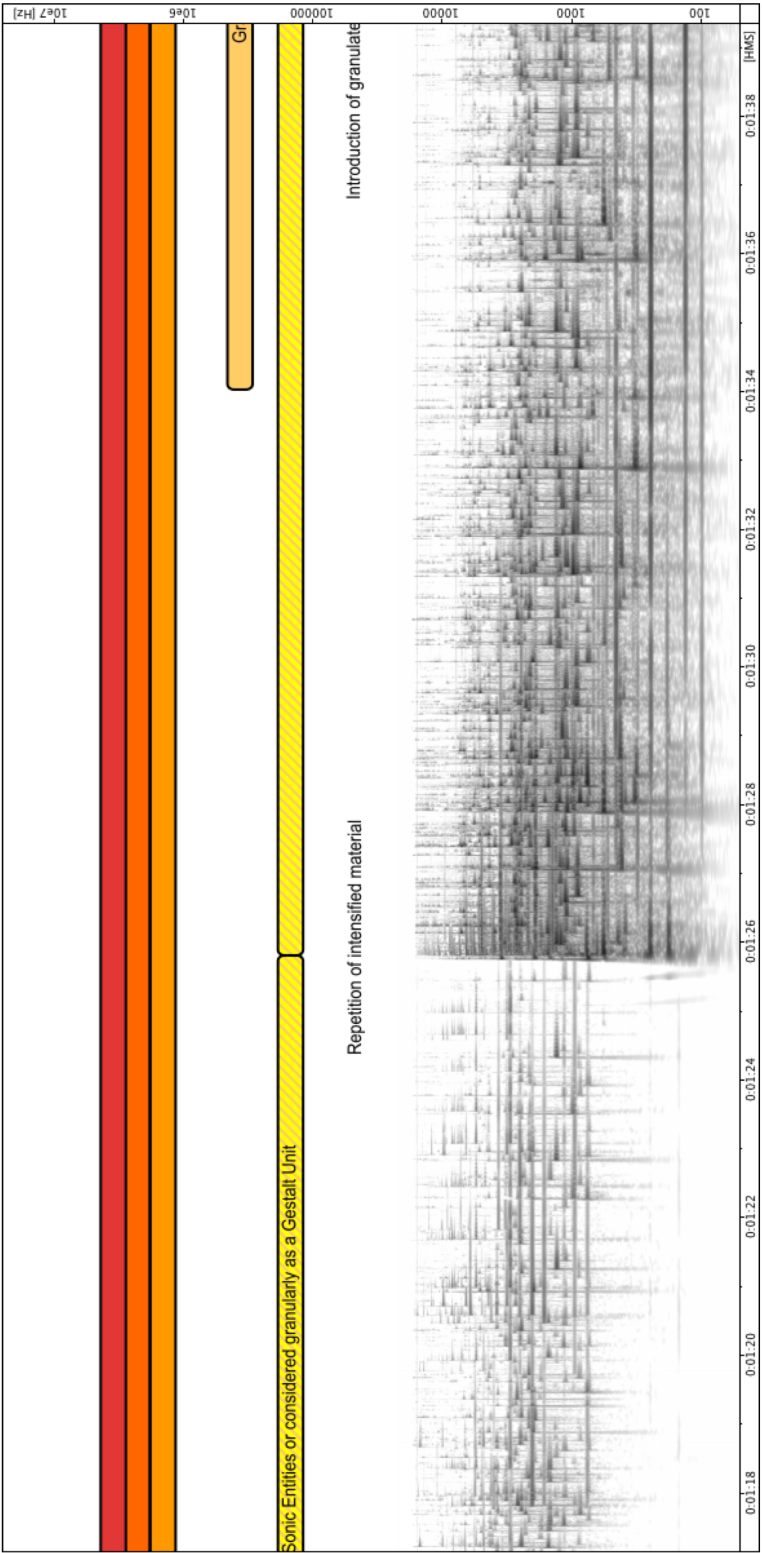
9.2 Appendix 2 – *Wind Chimes* extract example

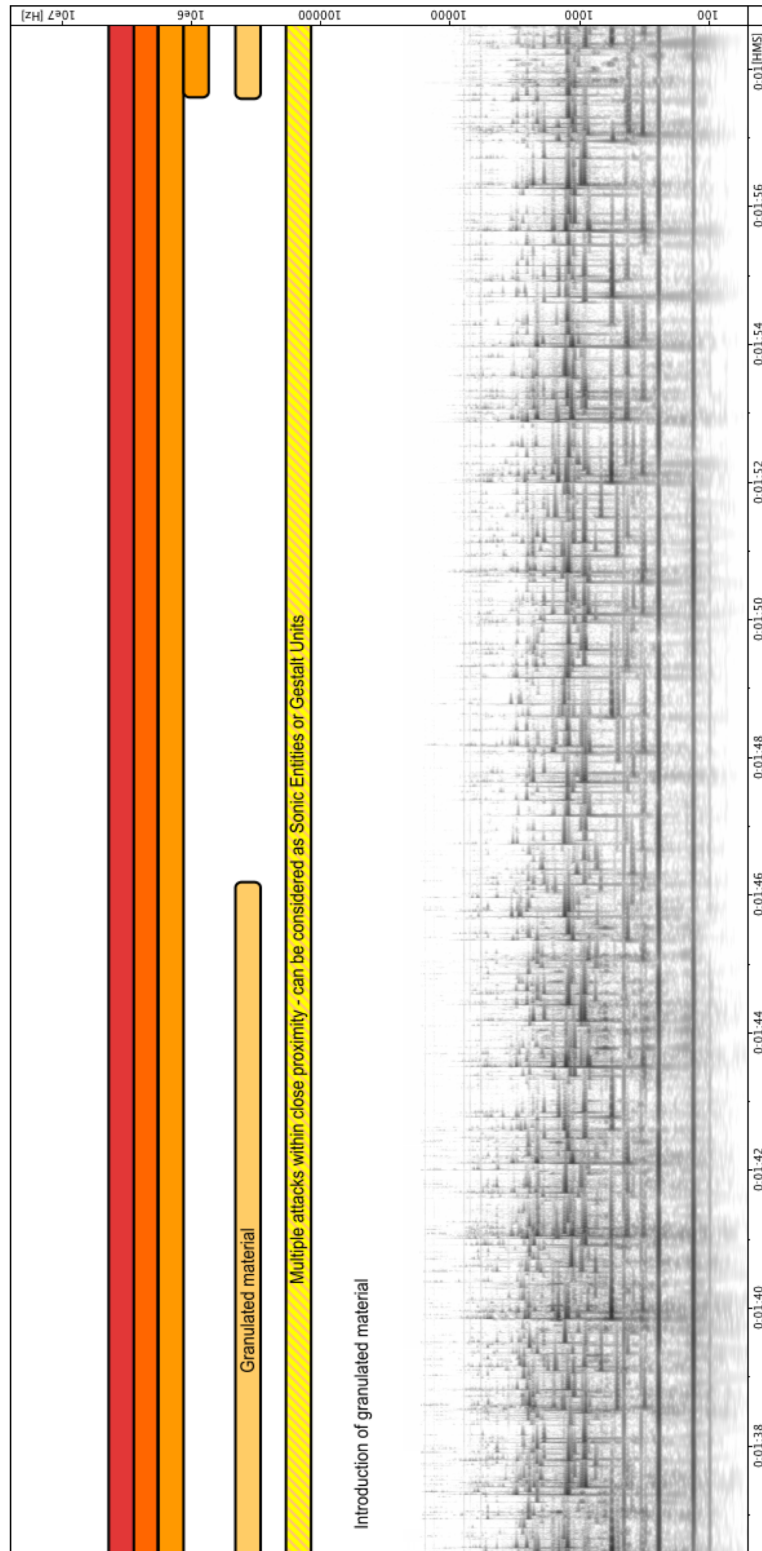


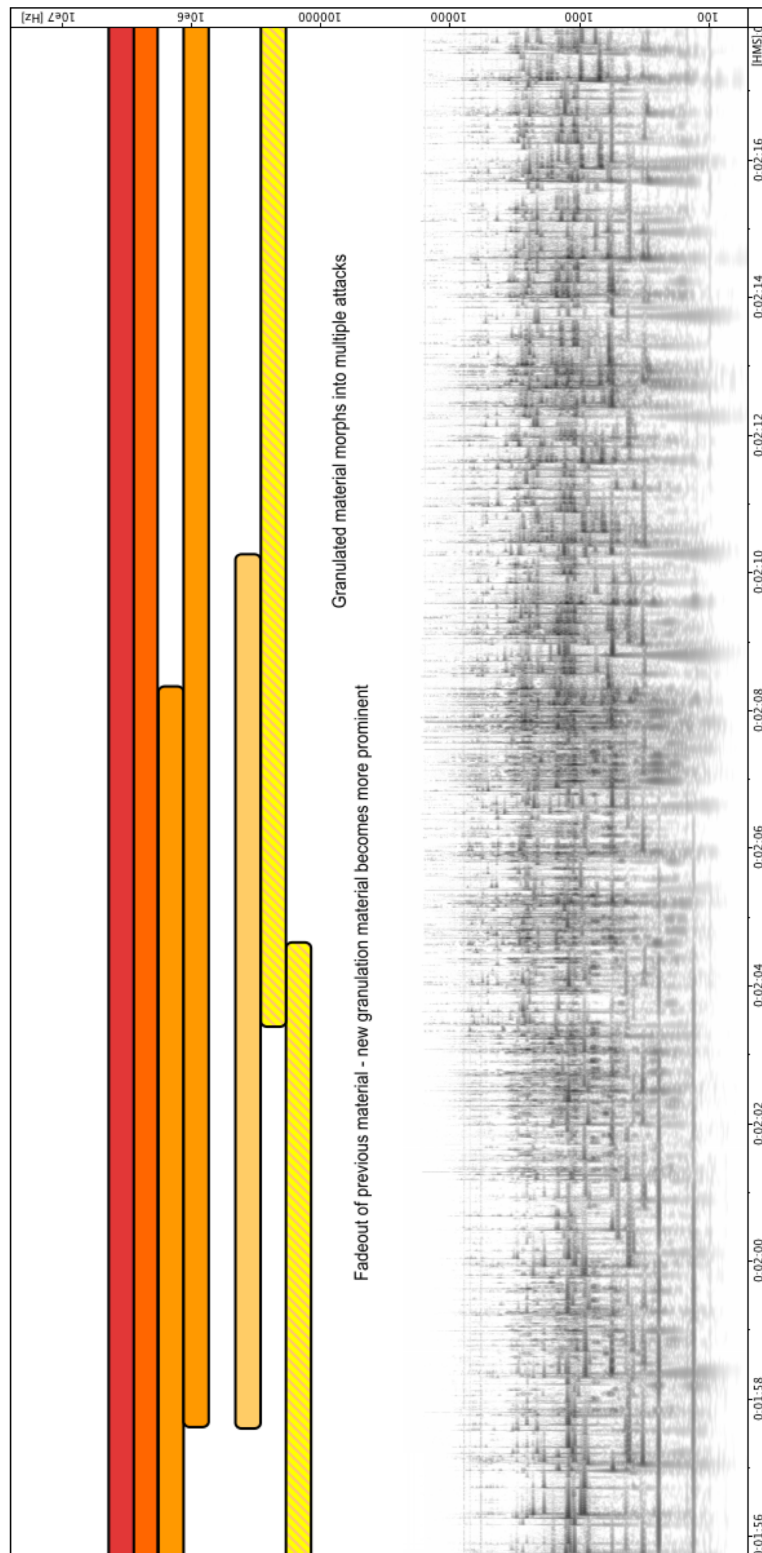


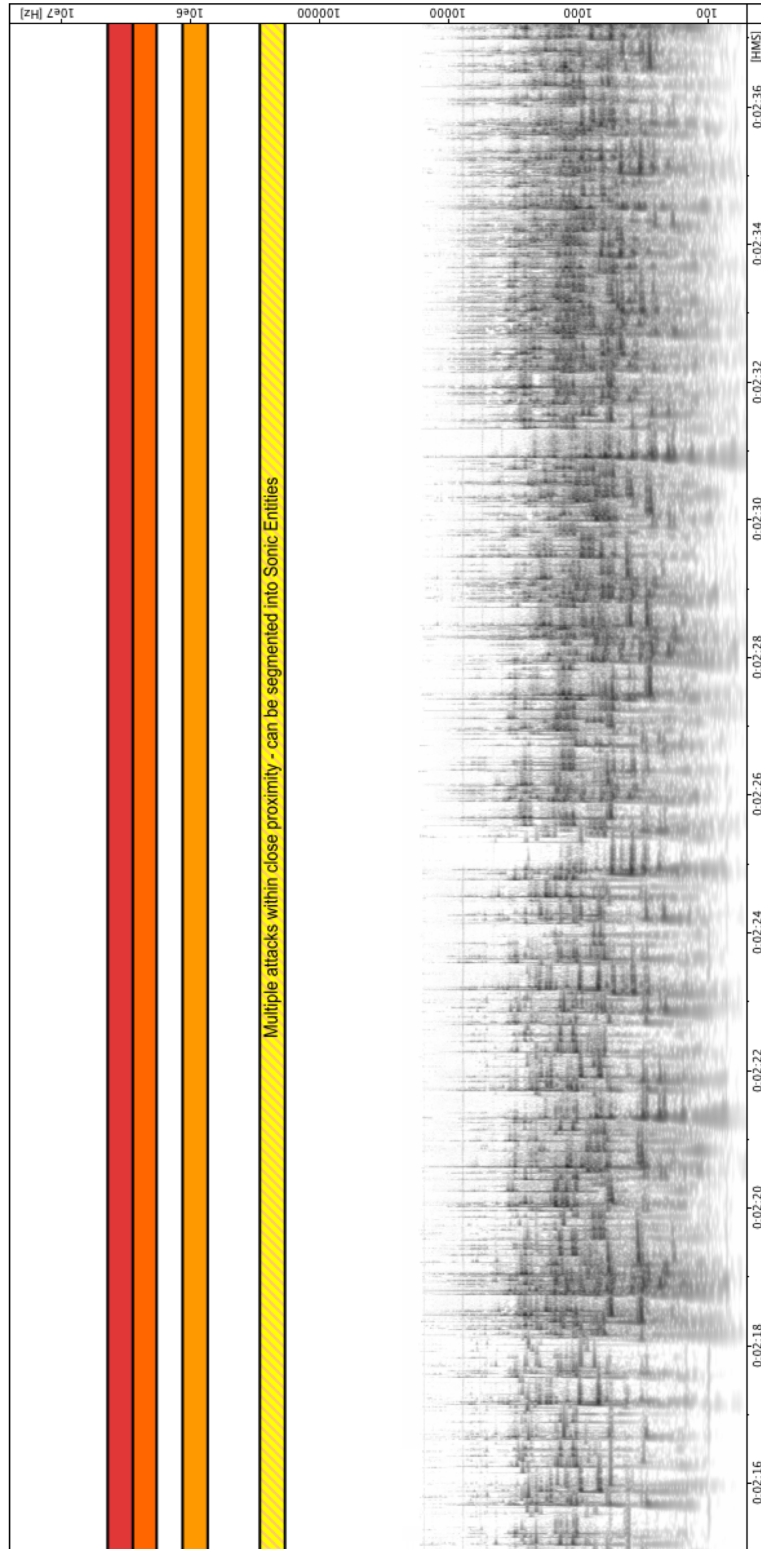


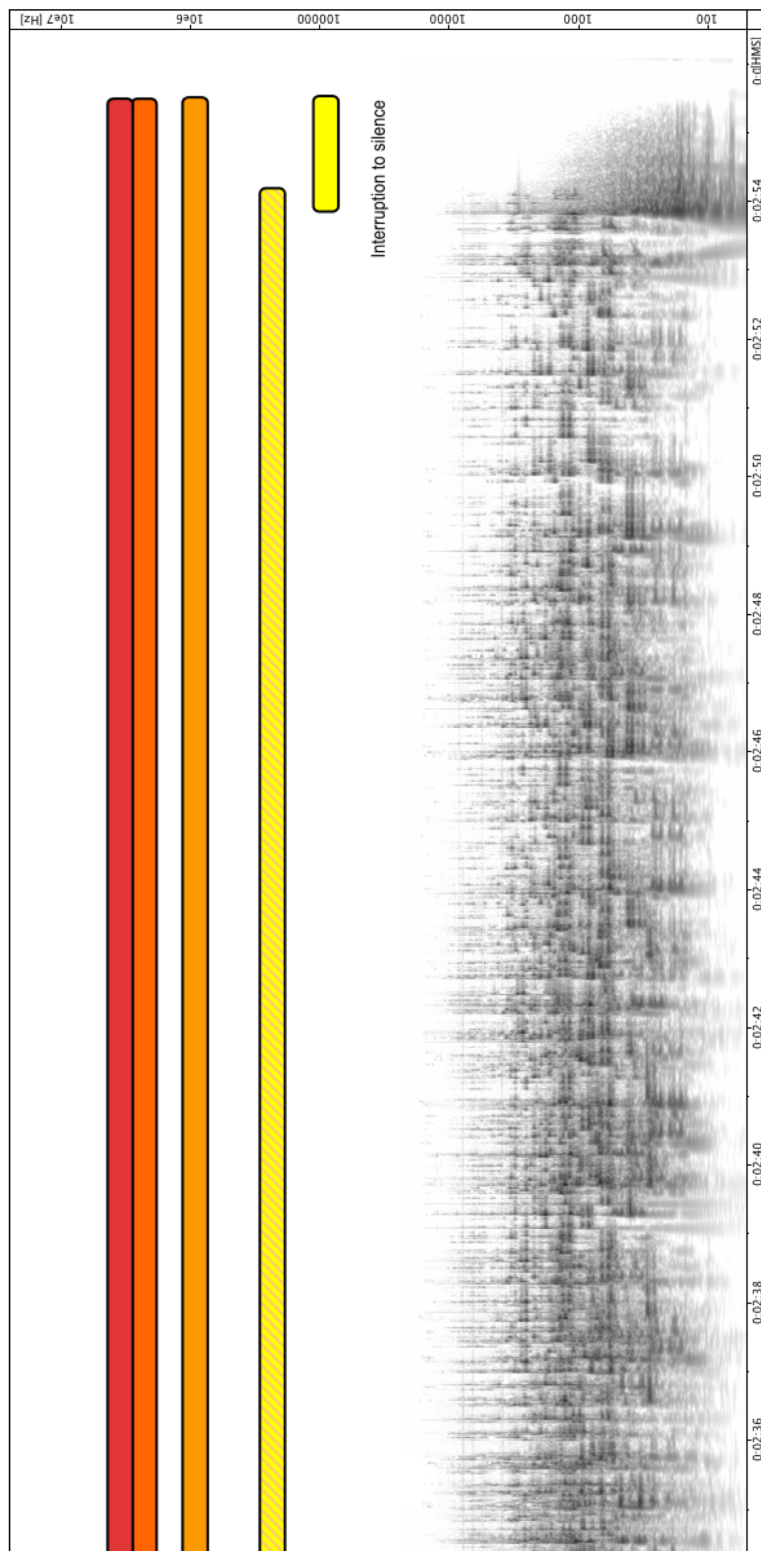




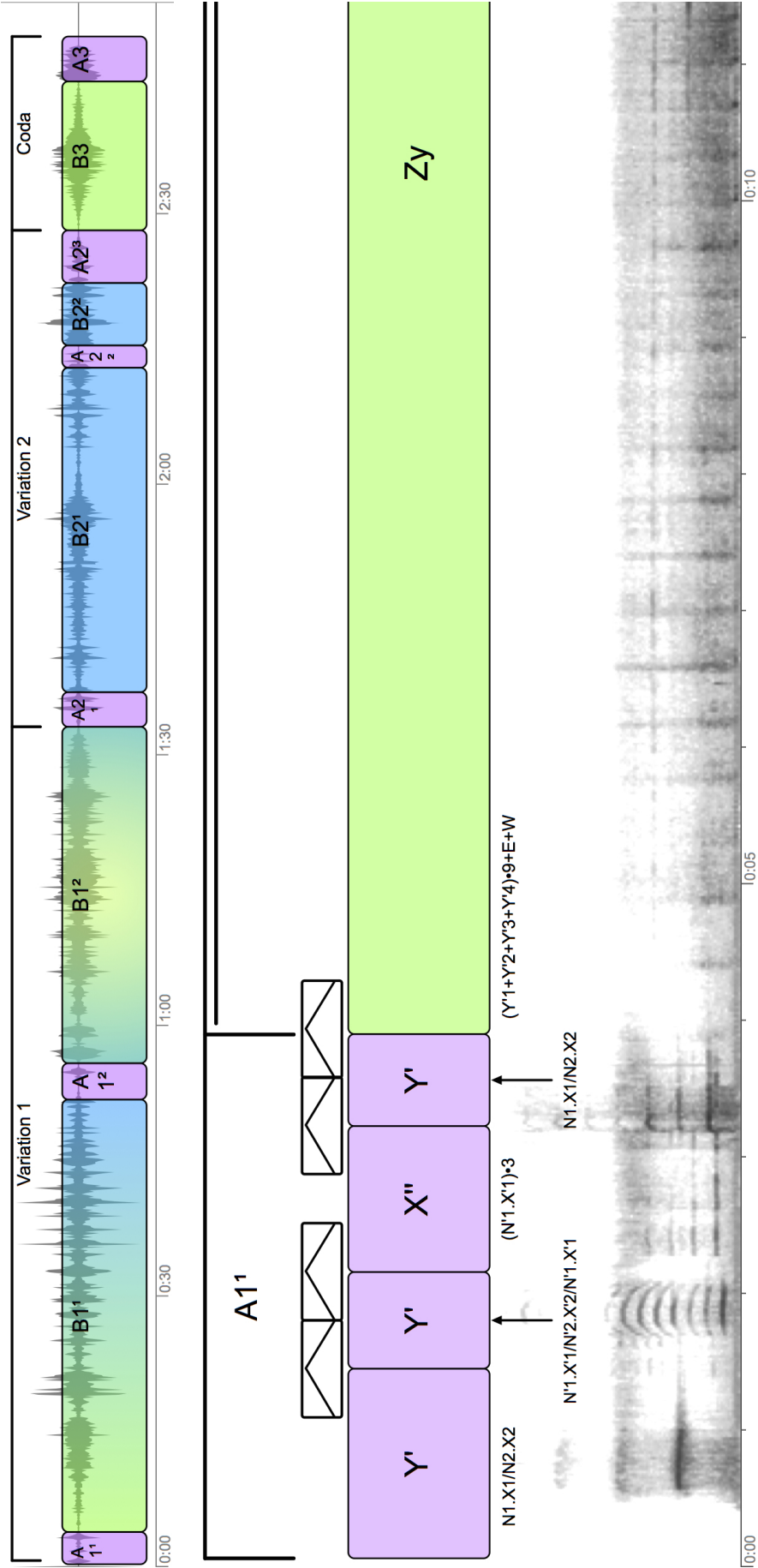


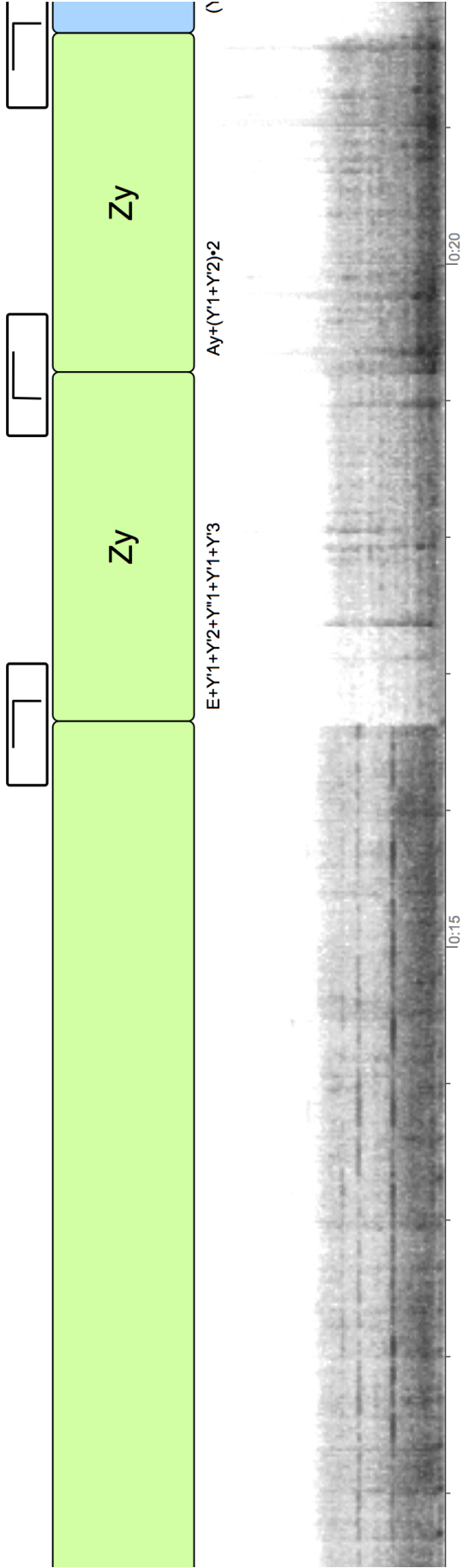
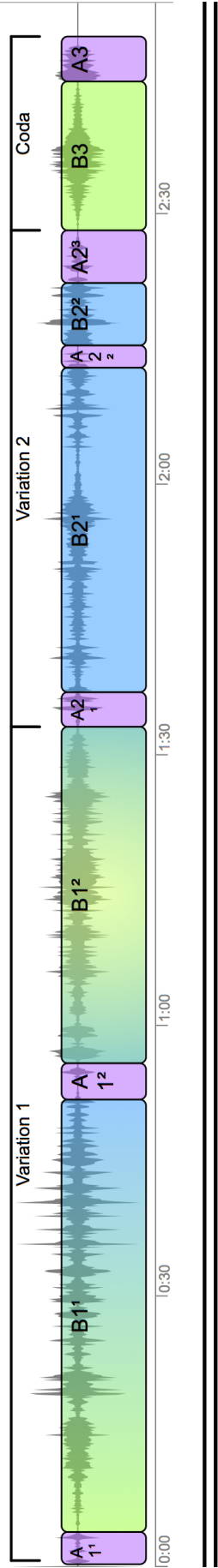


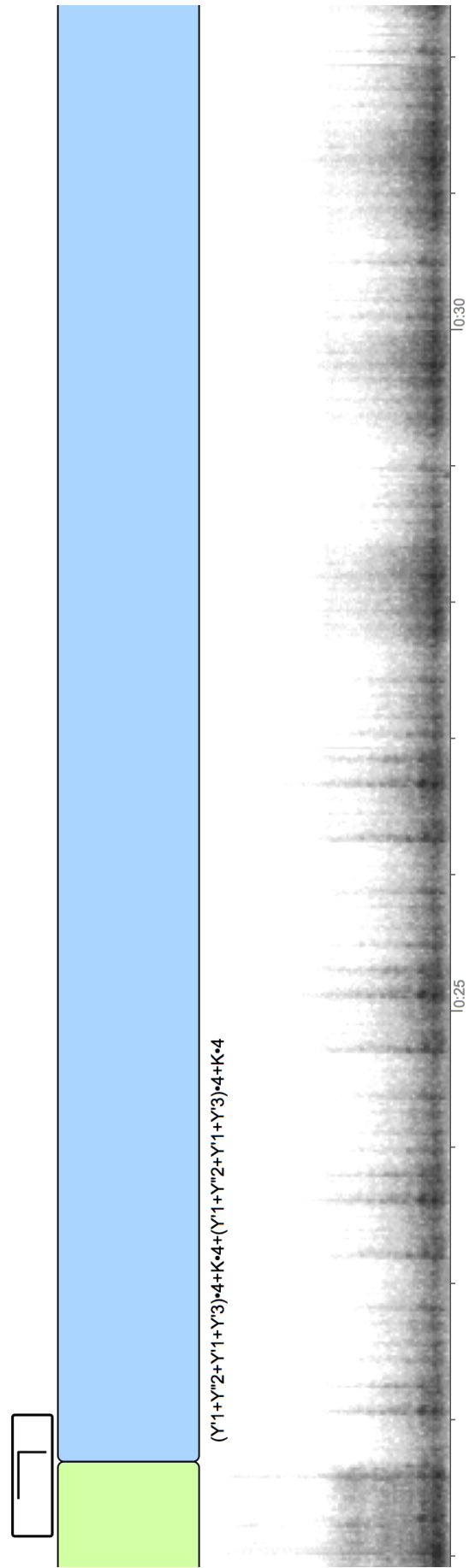
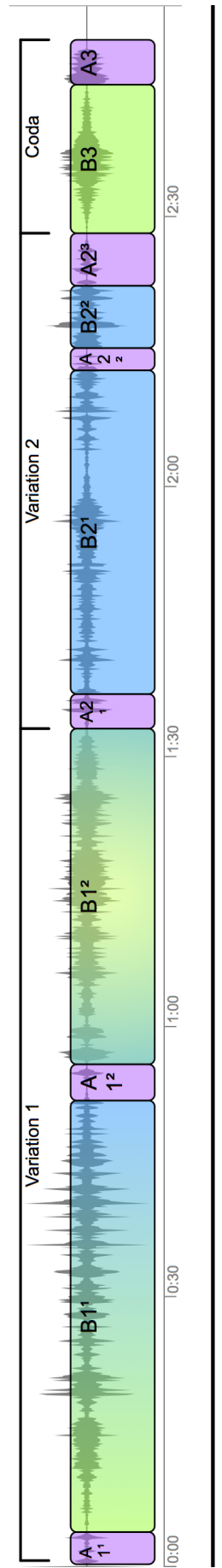


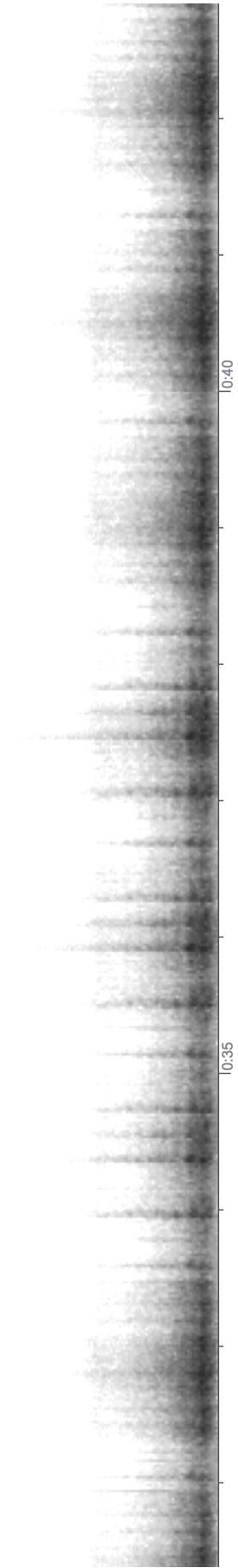
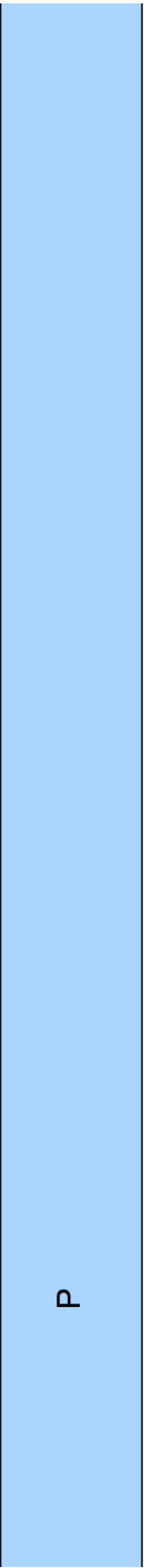
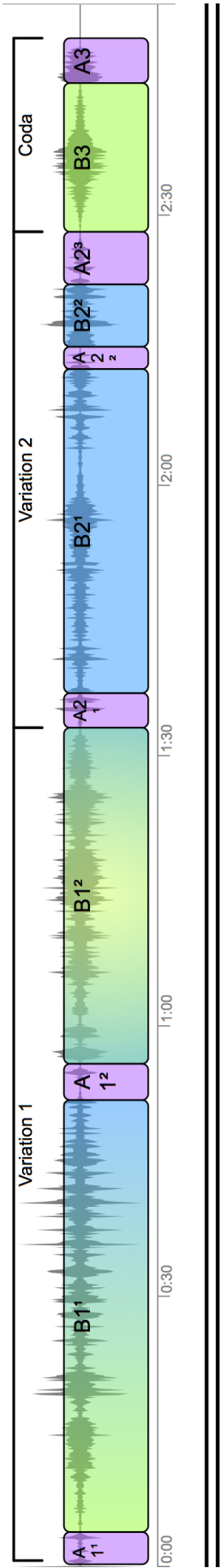


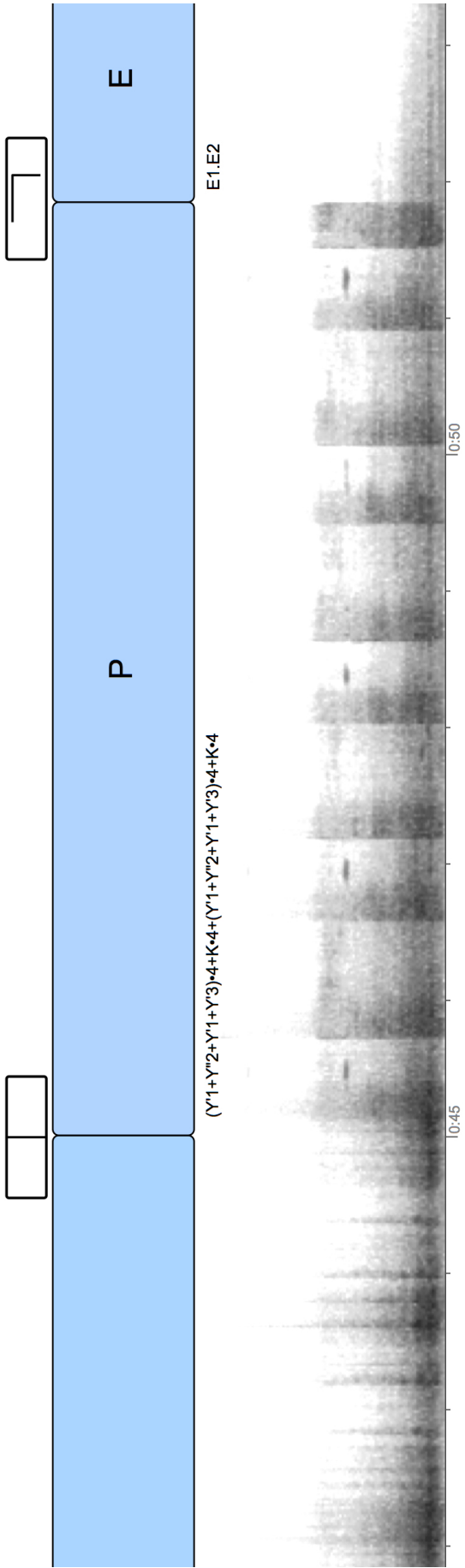
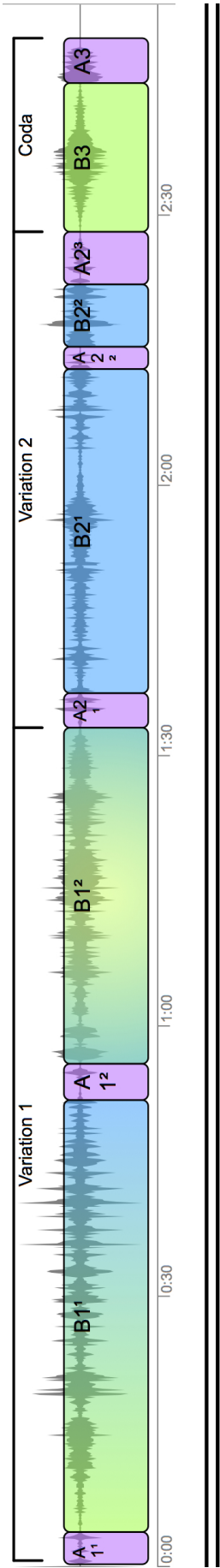
9.3 Appendix 3 – *Etude aux chemins de fer analysis*

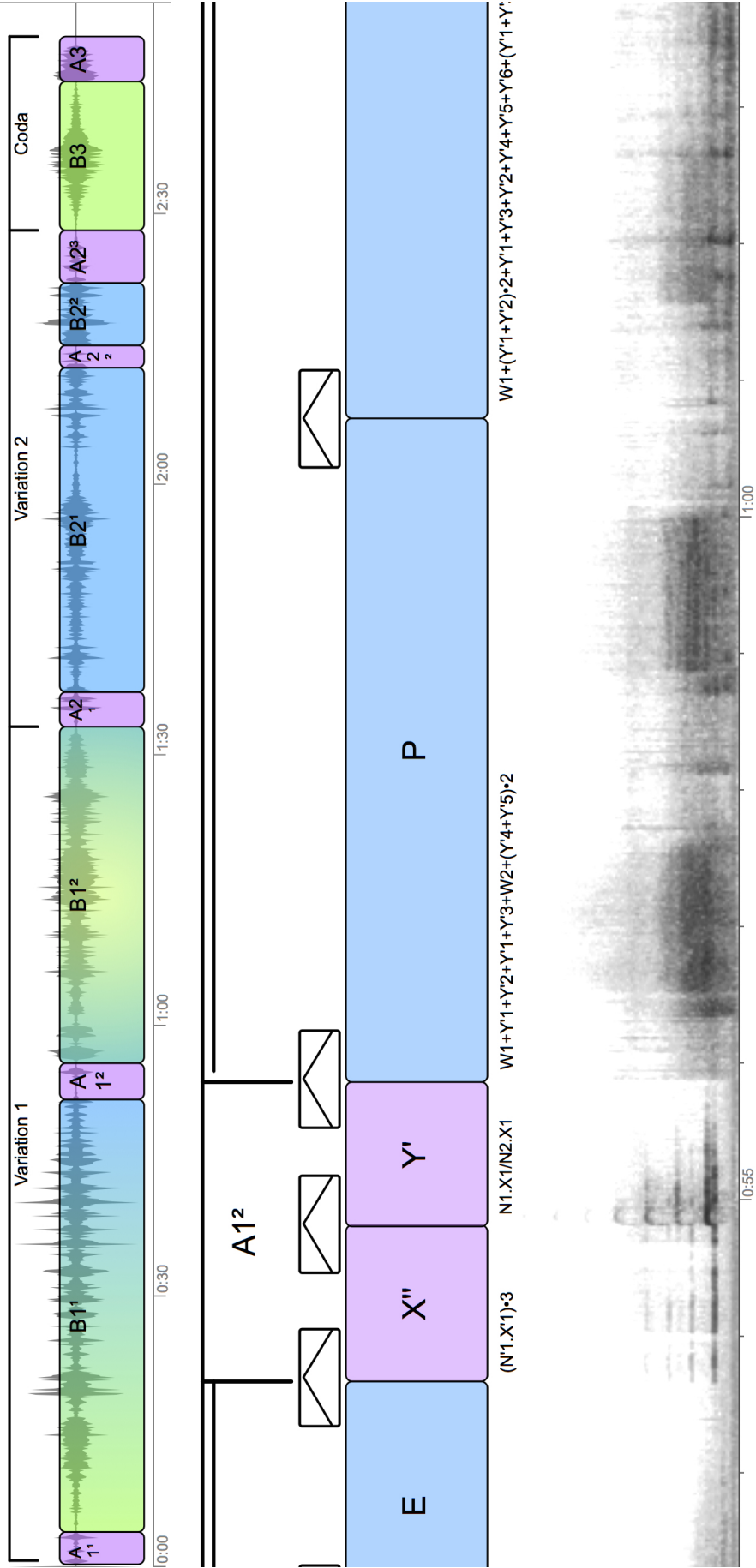


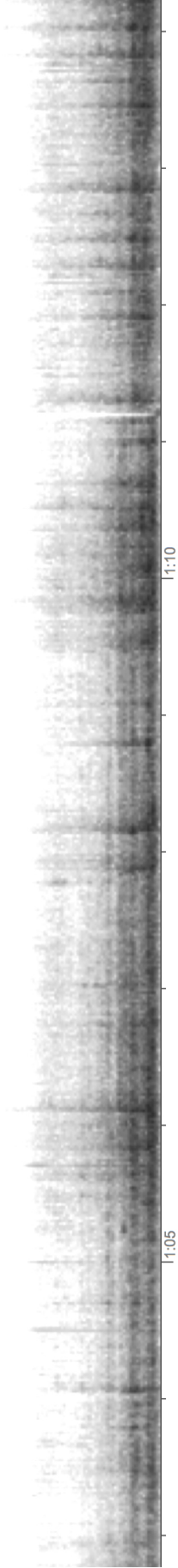
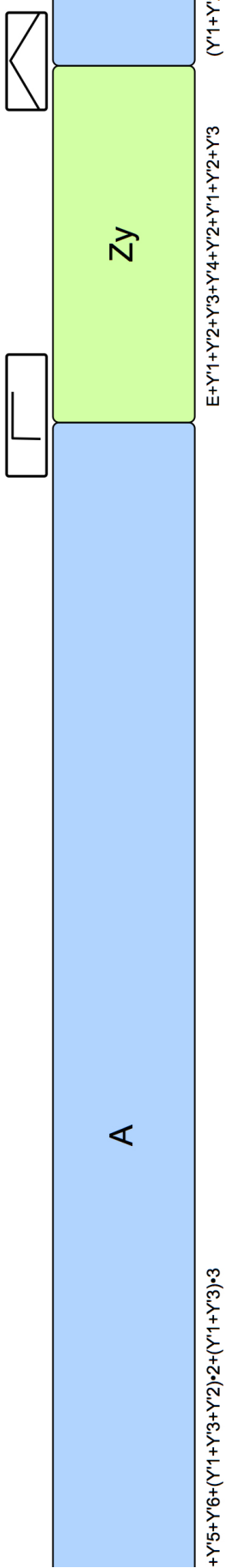
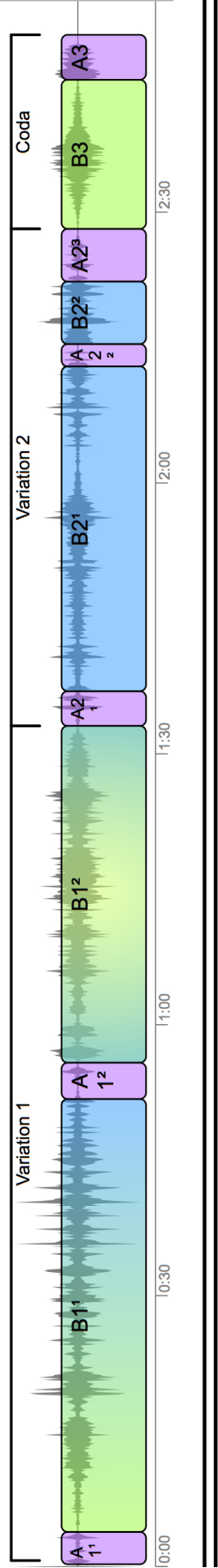


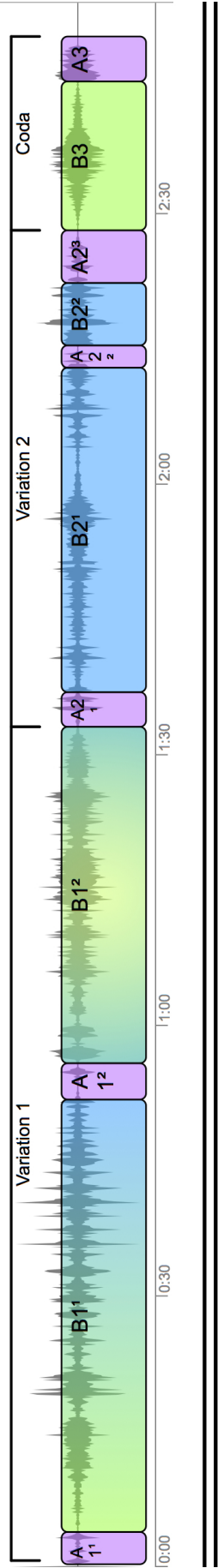




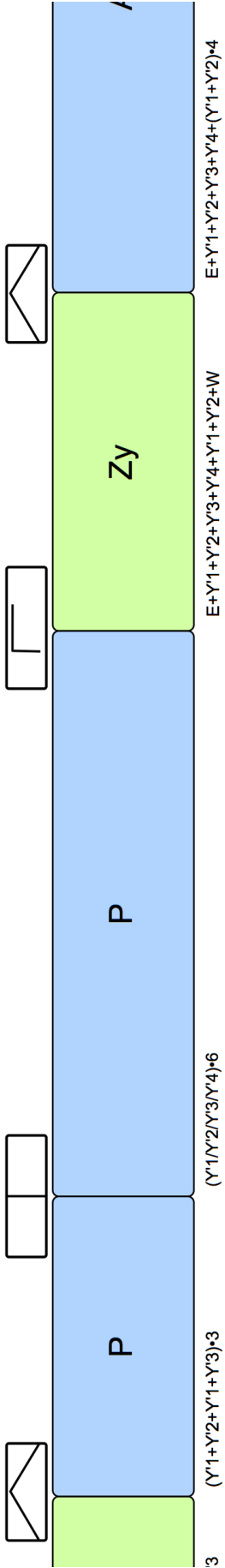


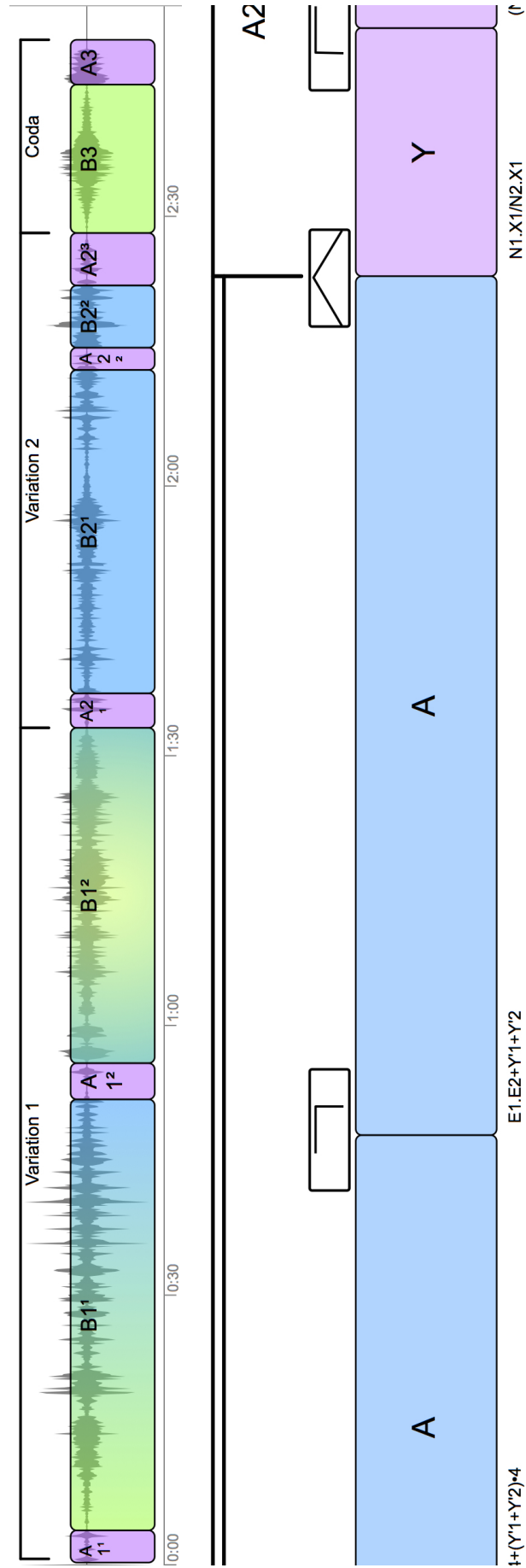


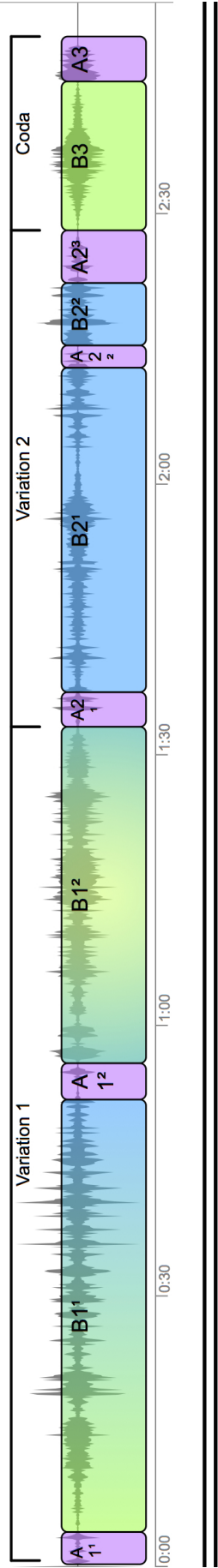




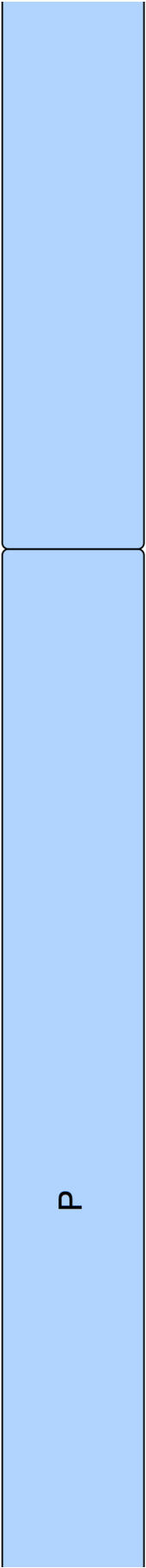
B₁²





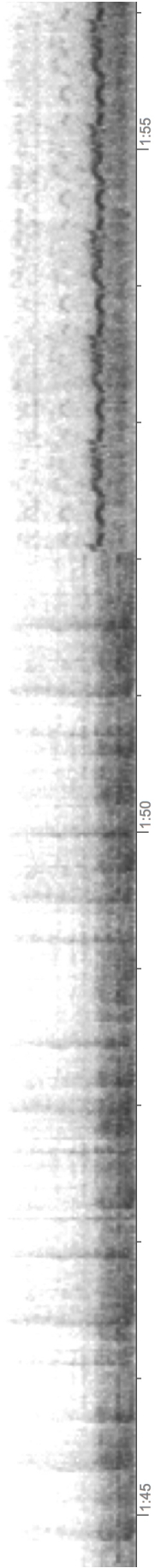


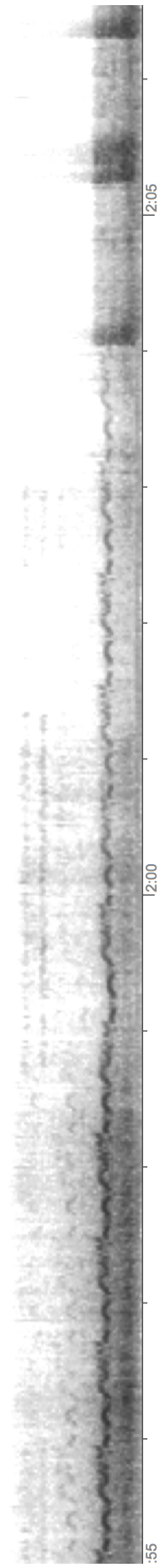
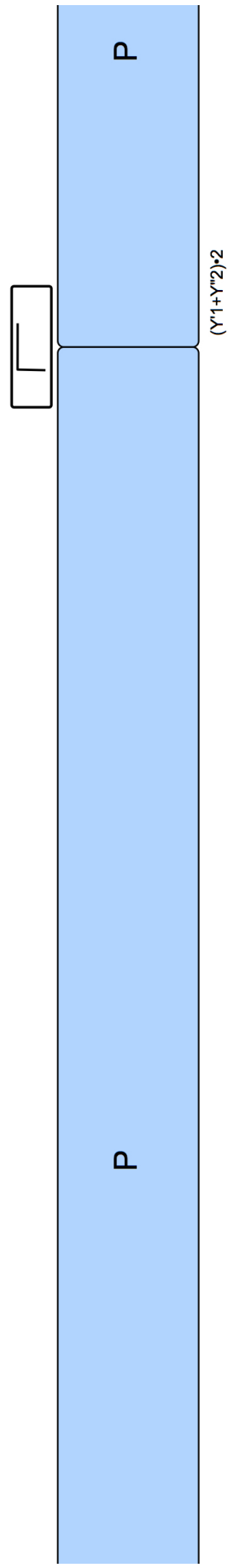
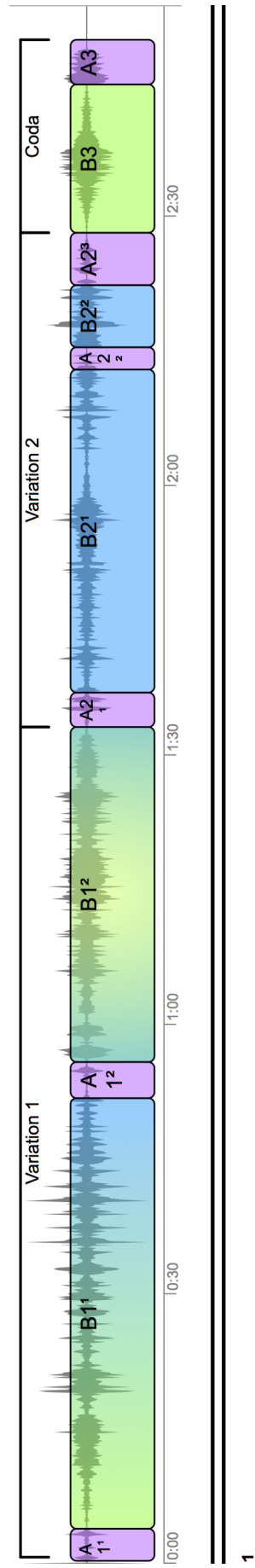
B2¹

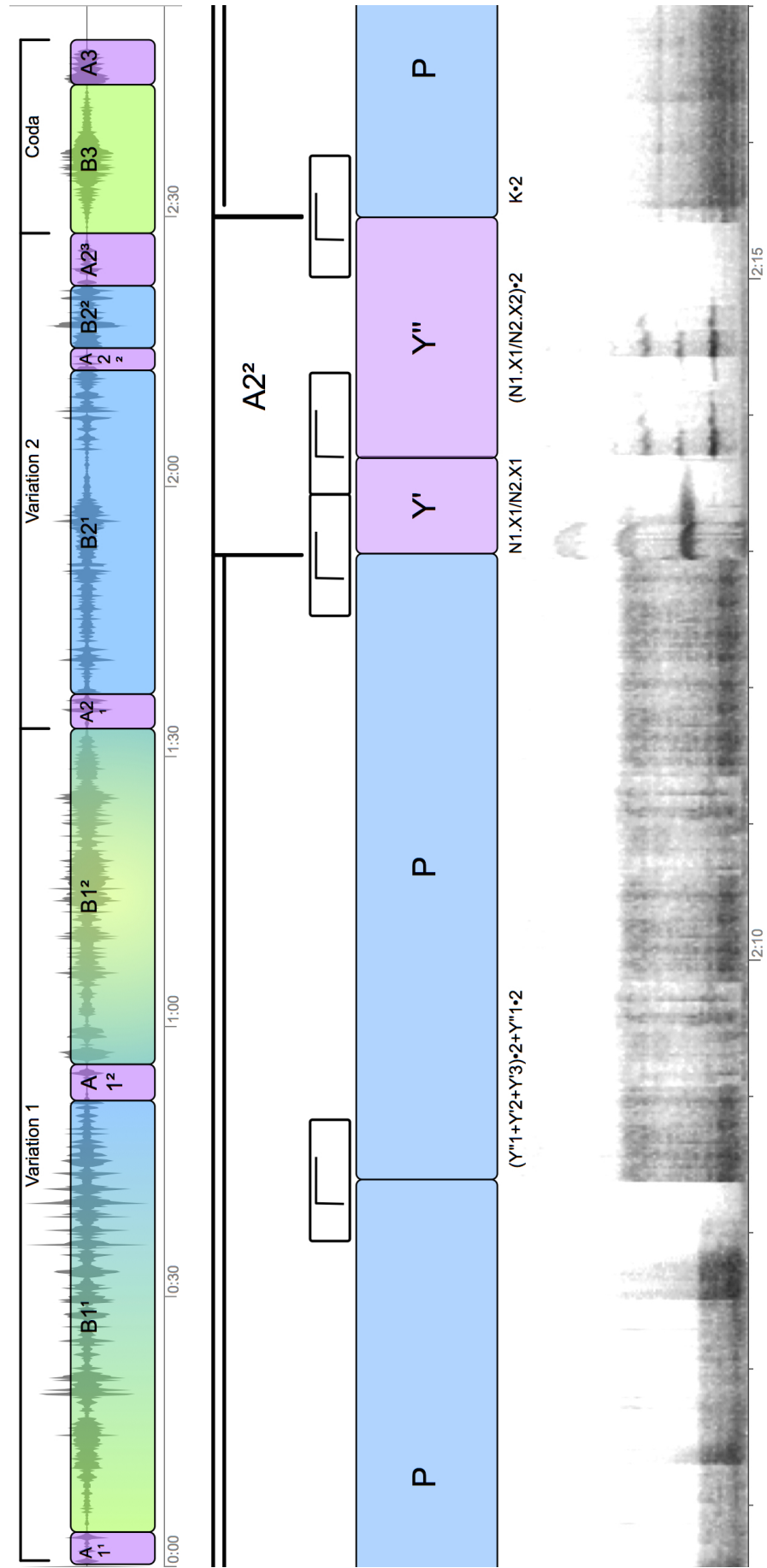


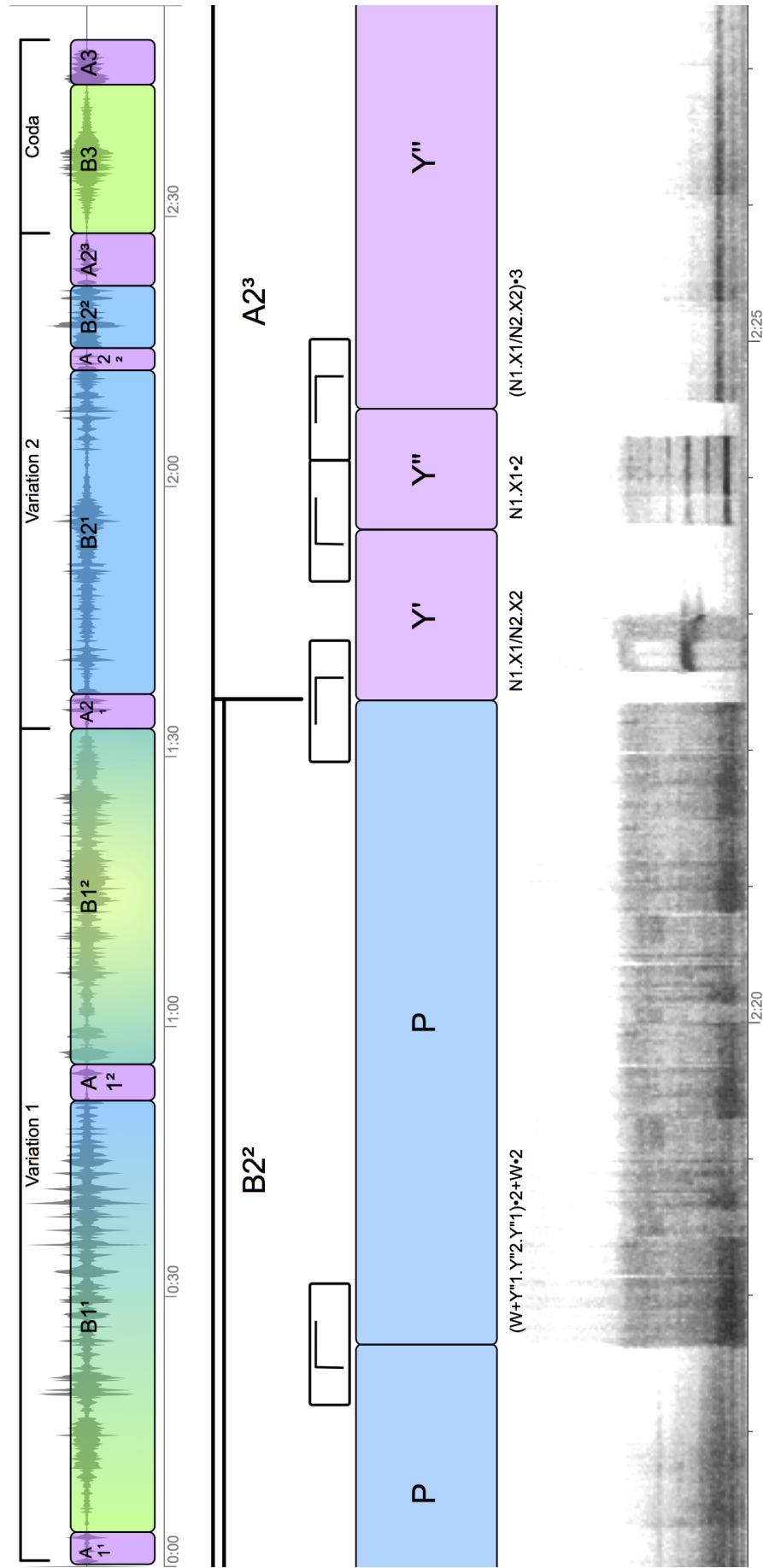
5+Y⁴•5

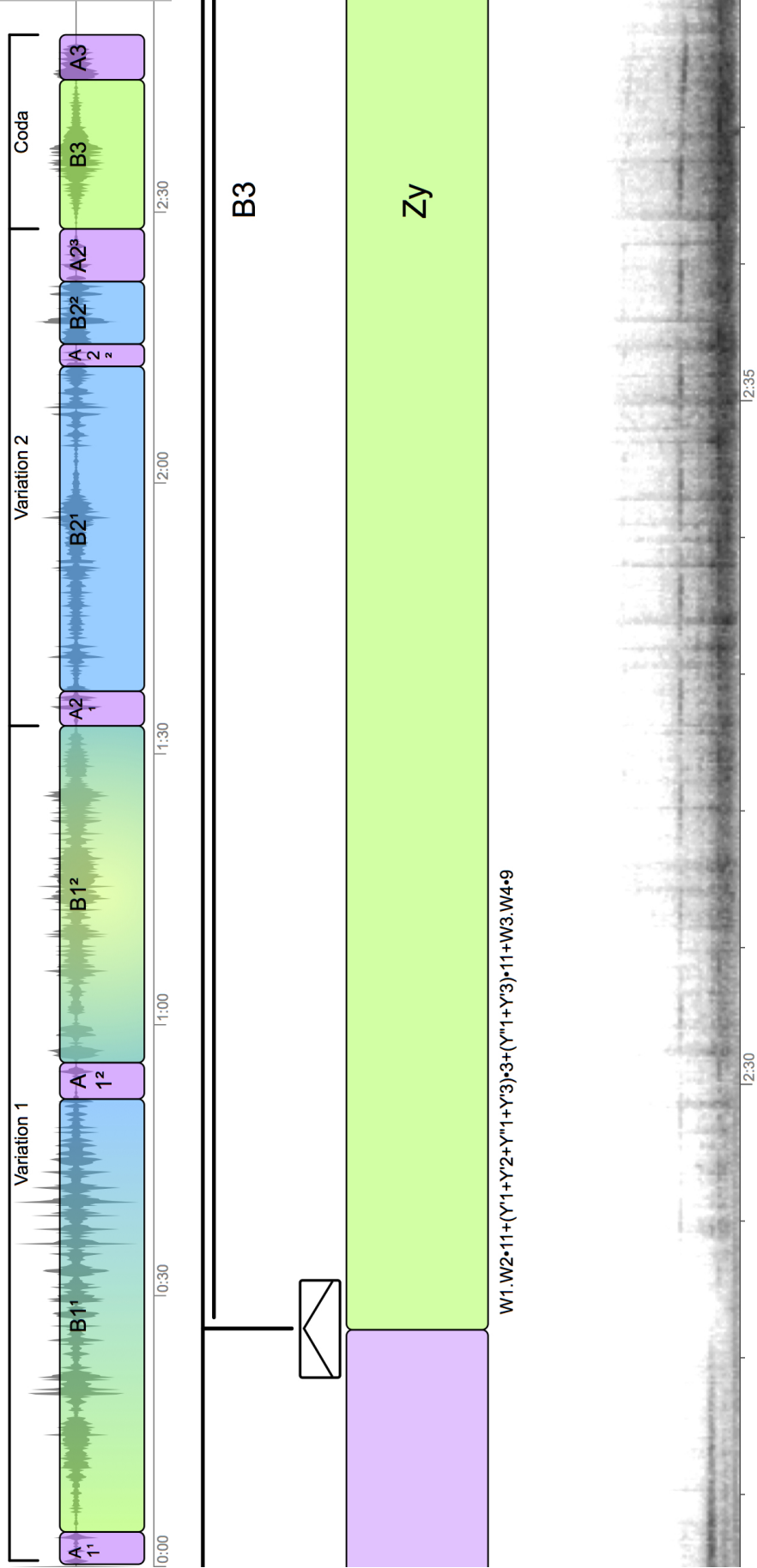
(N¹•X¹/N²•X¹)•9+(N³•X²+N⁴•X²)•6

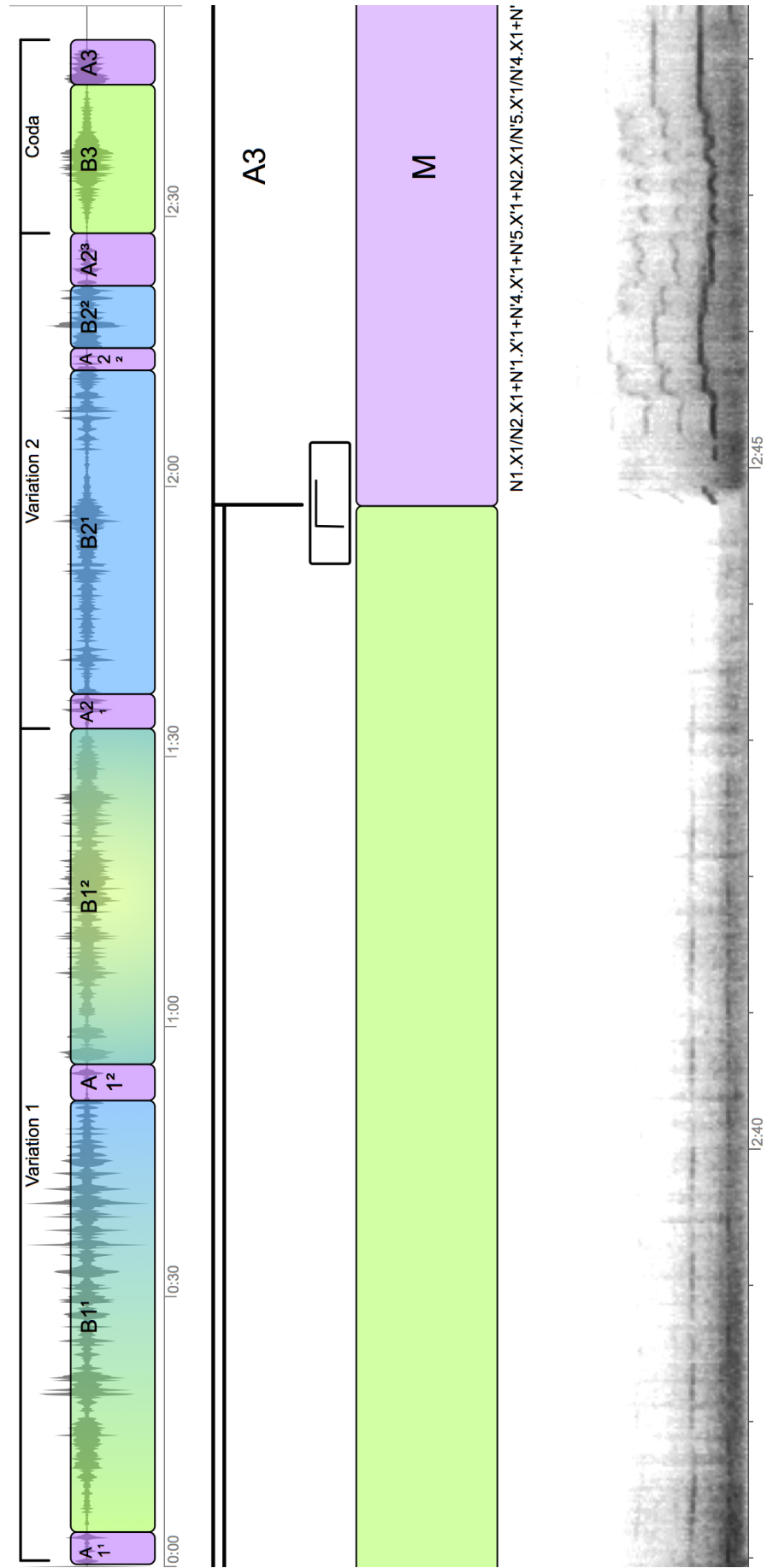


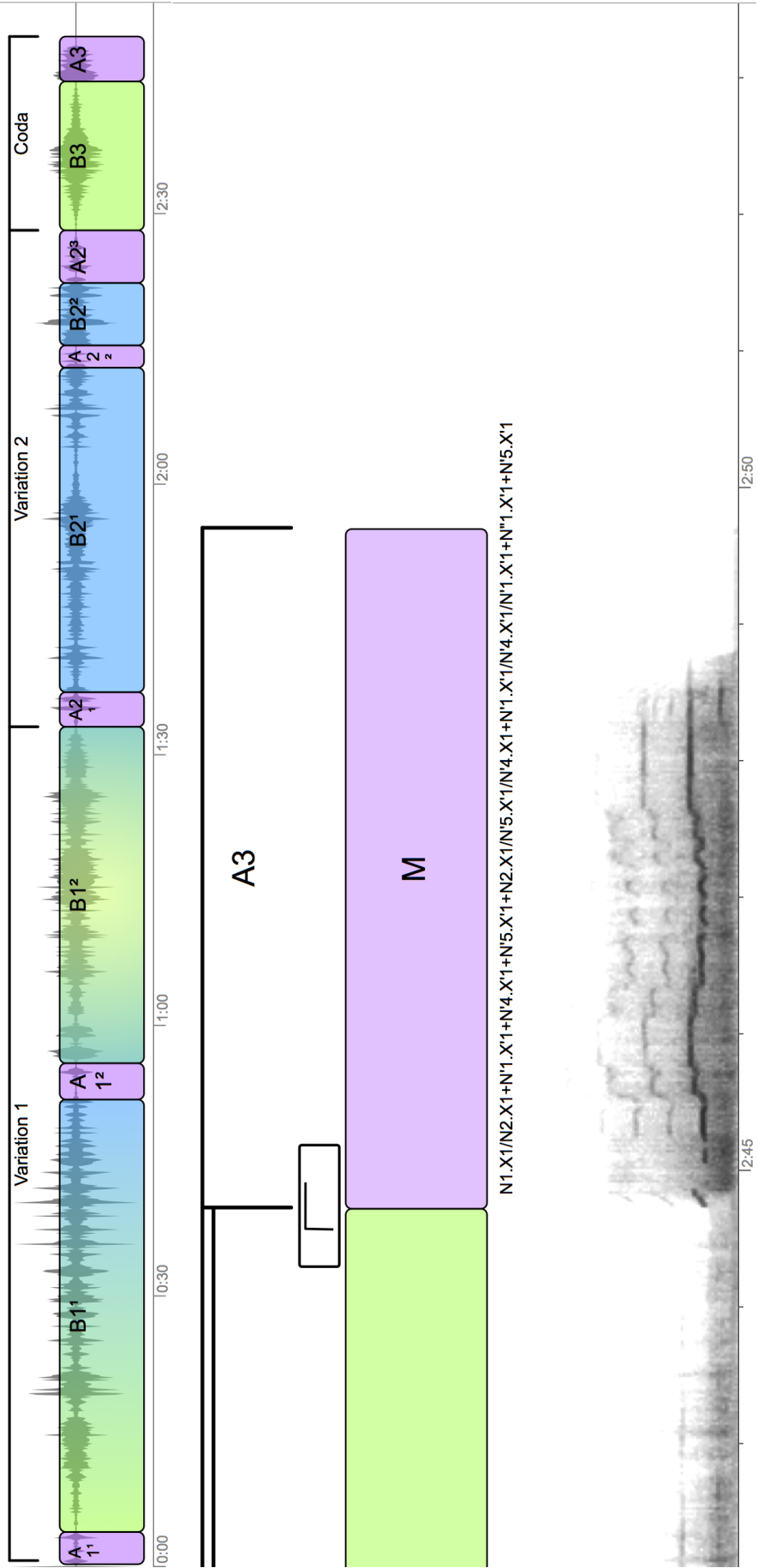




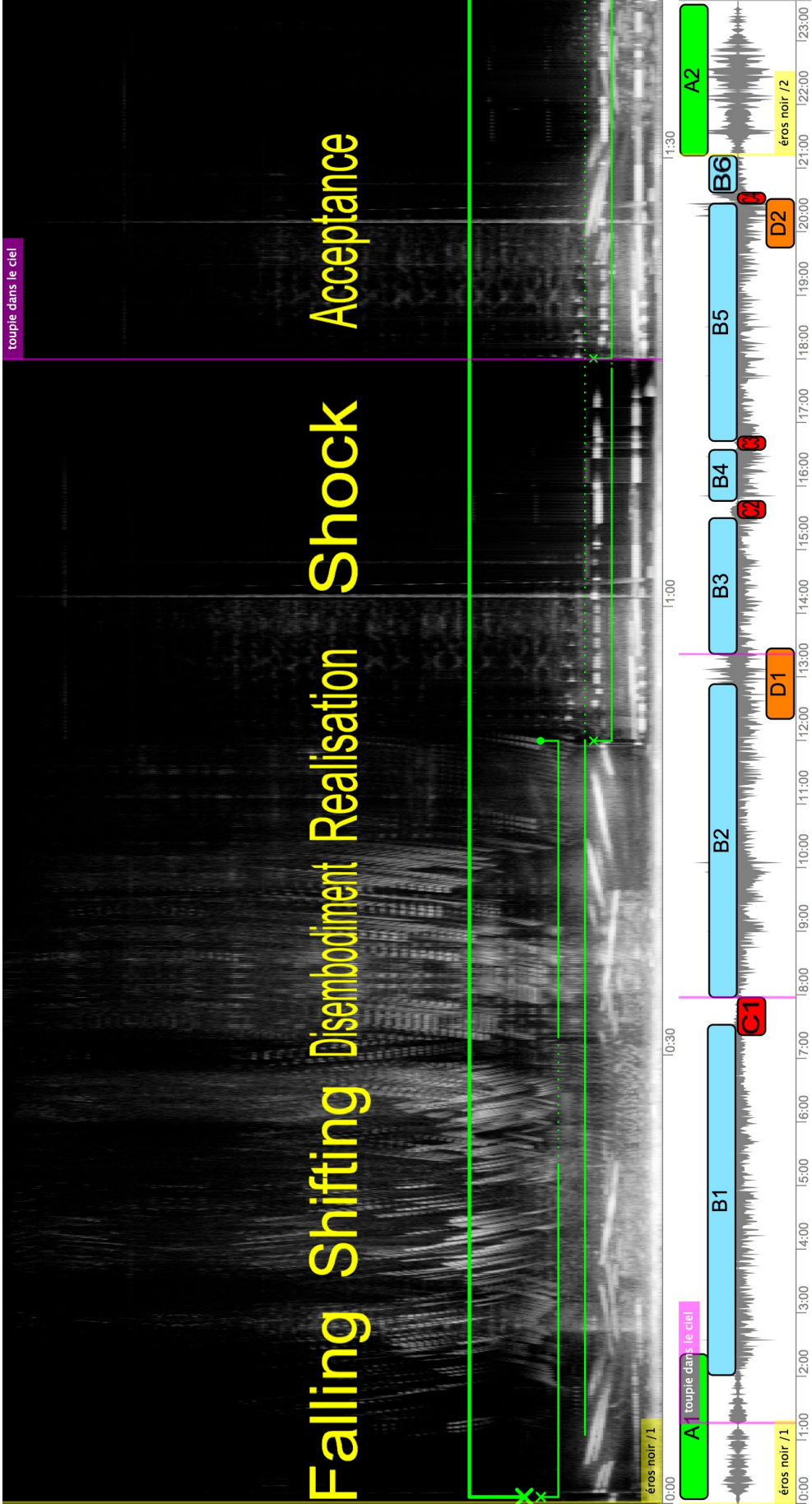








9.4 Appendix 4 – *Toupie dans le ciel* analysis

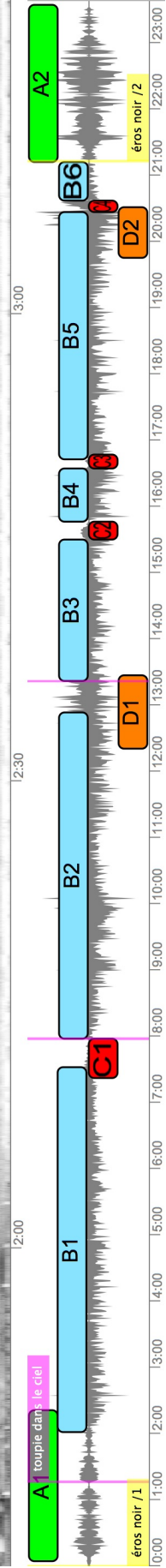
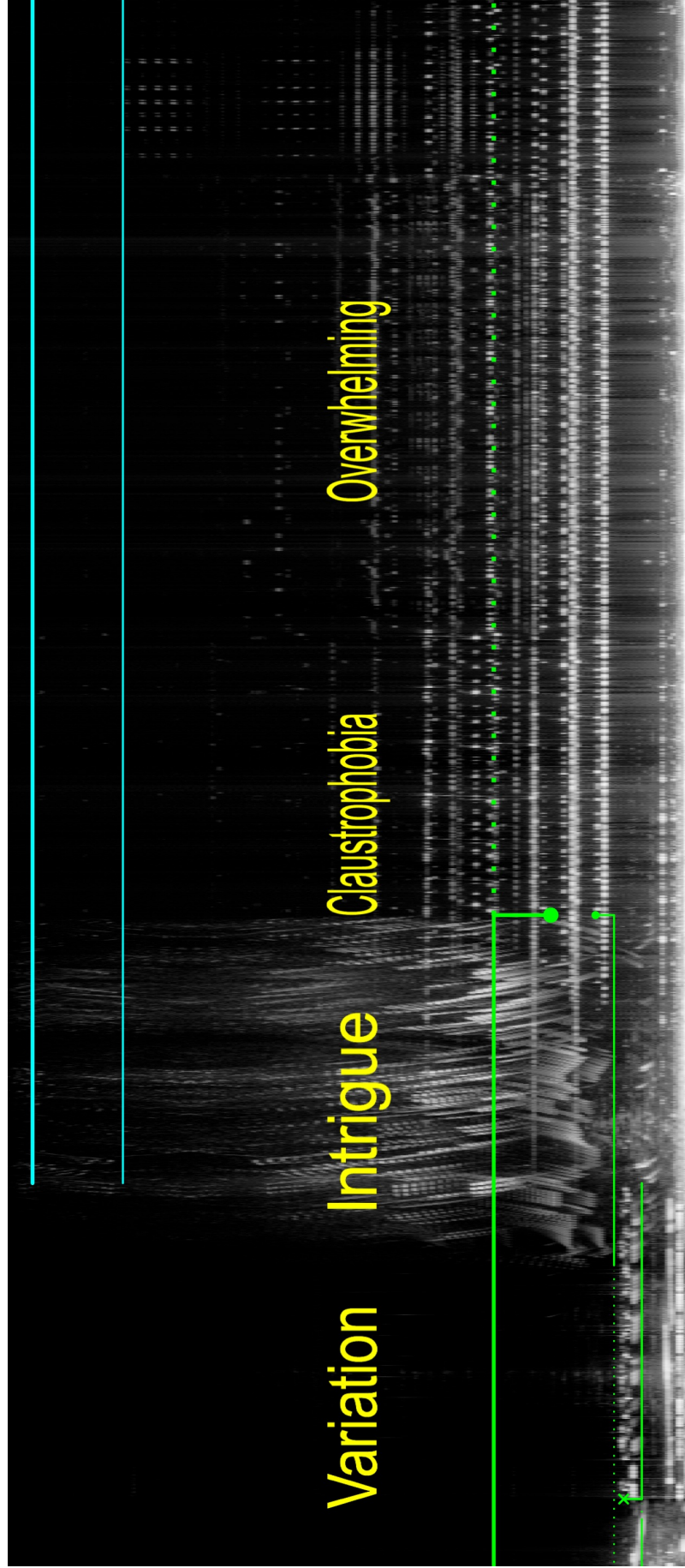


Variation

Intrigue

Claustrophobia

Overwhelming

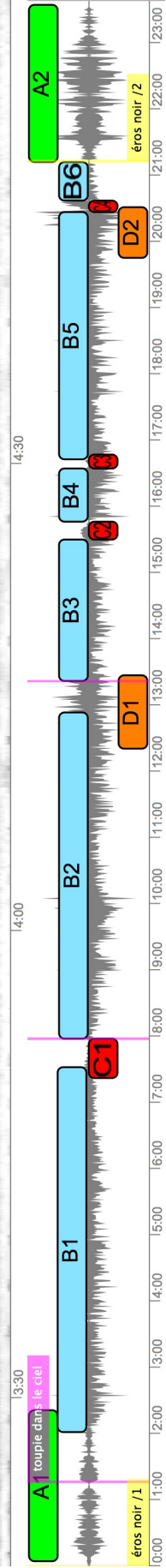
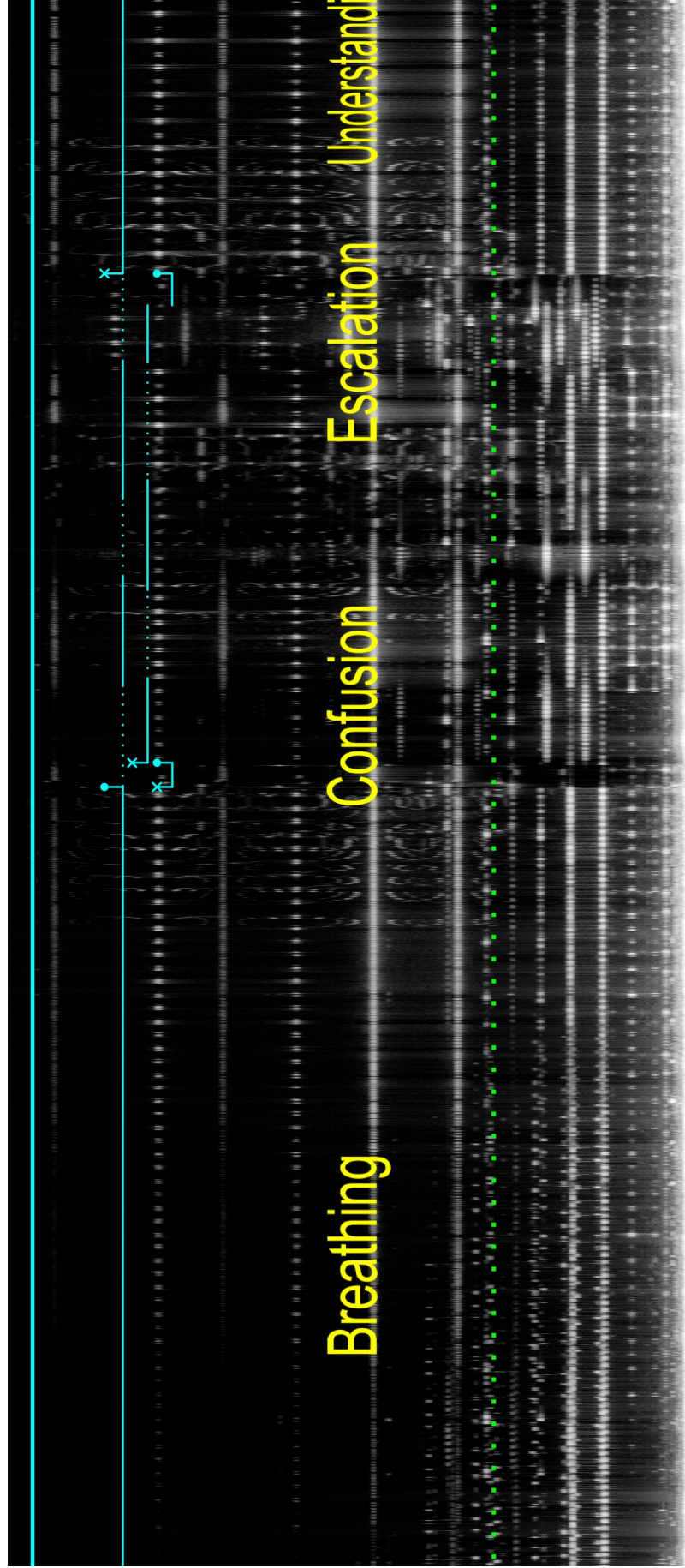


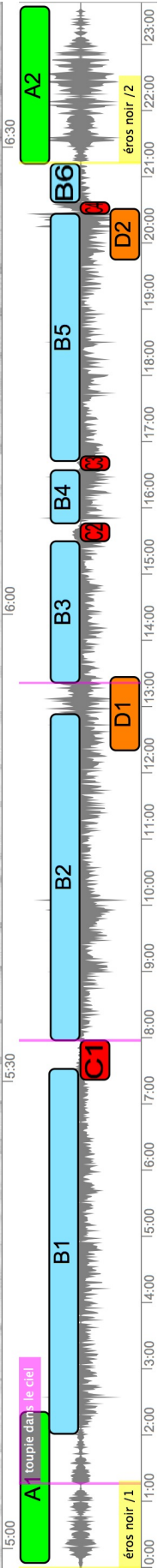
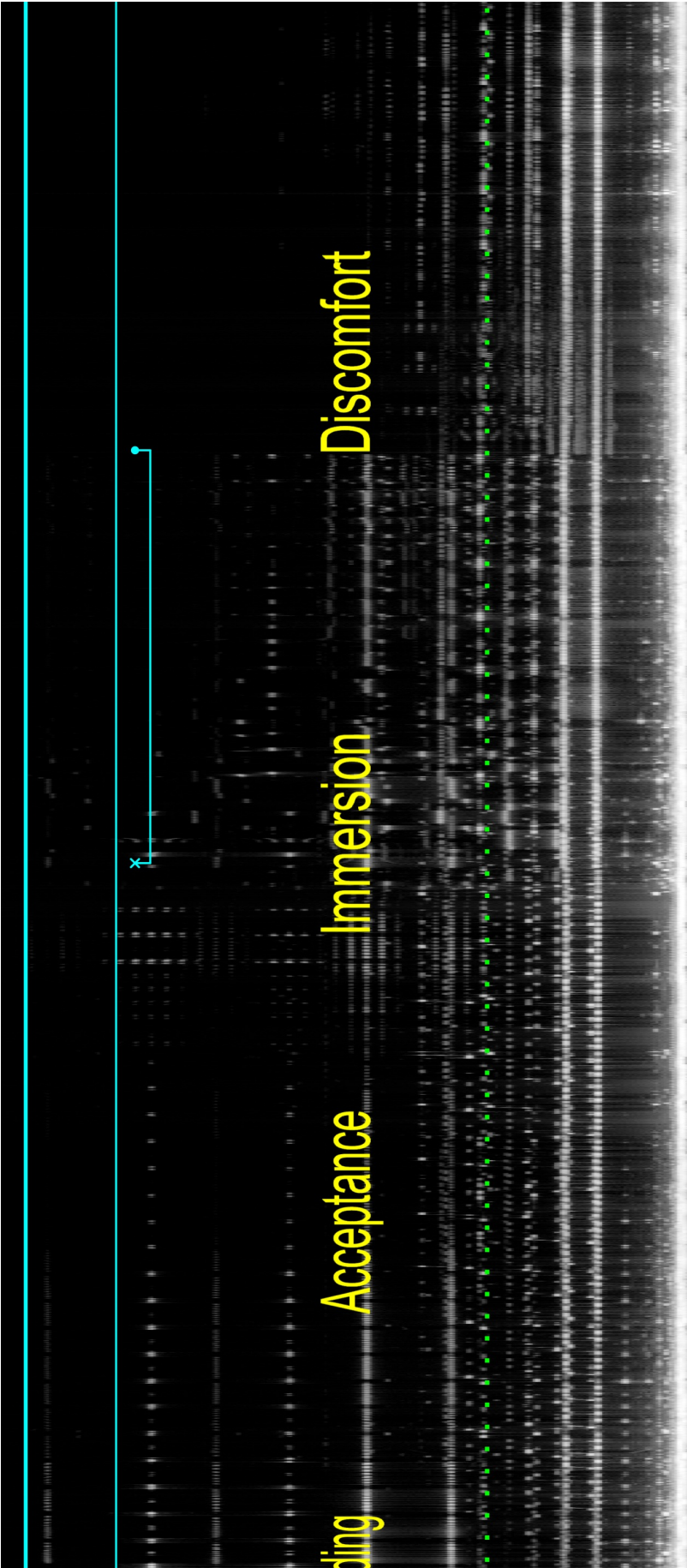
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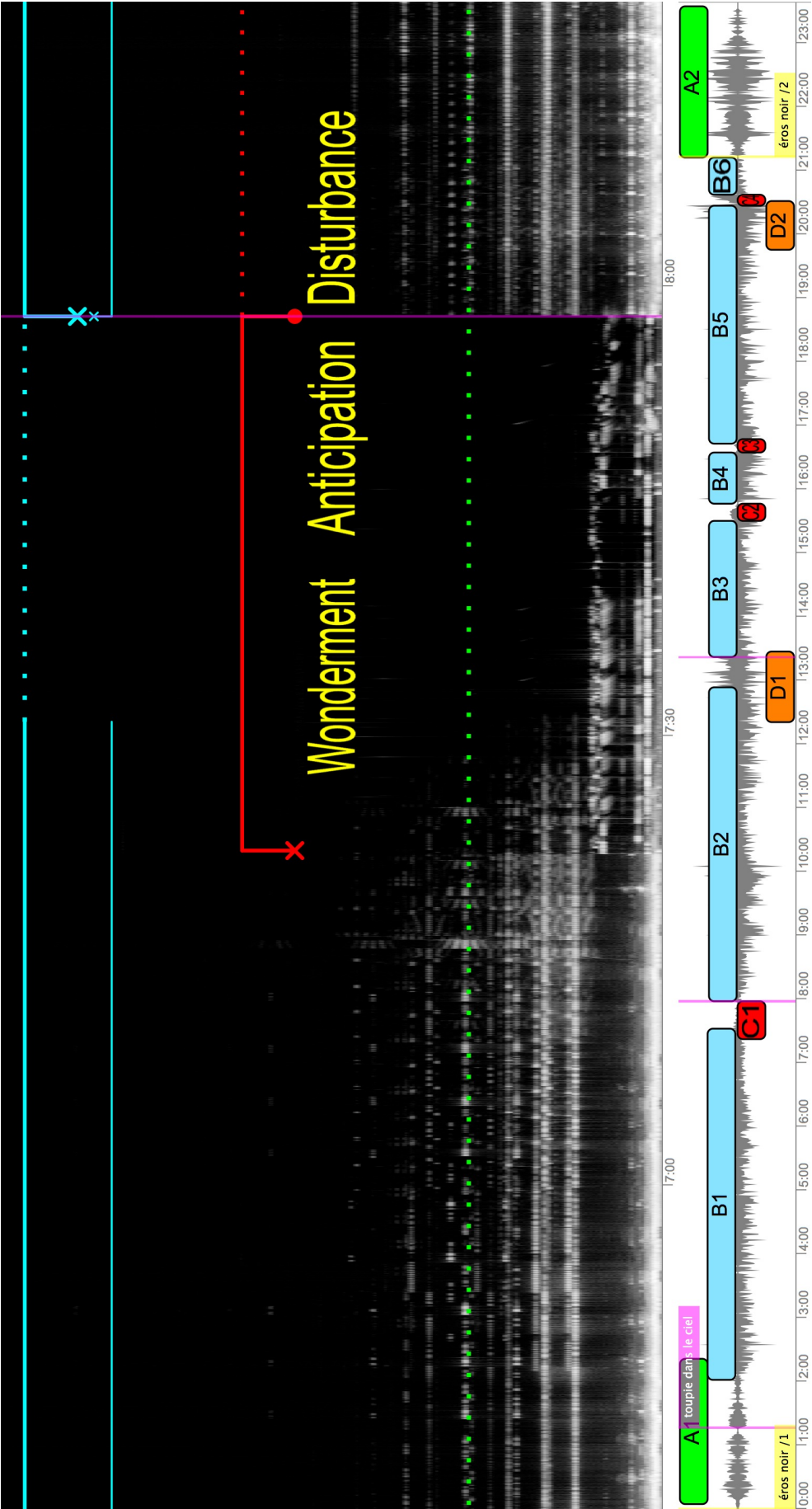
Confusion

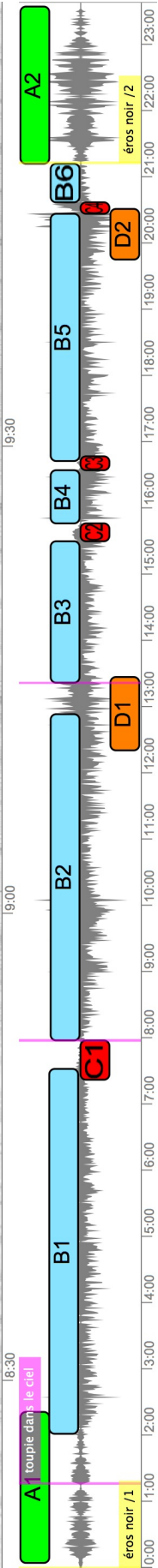
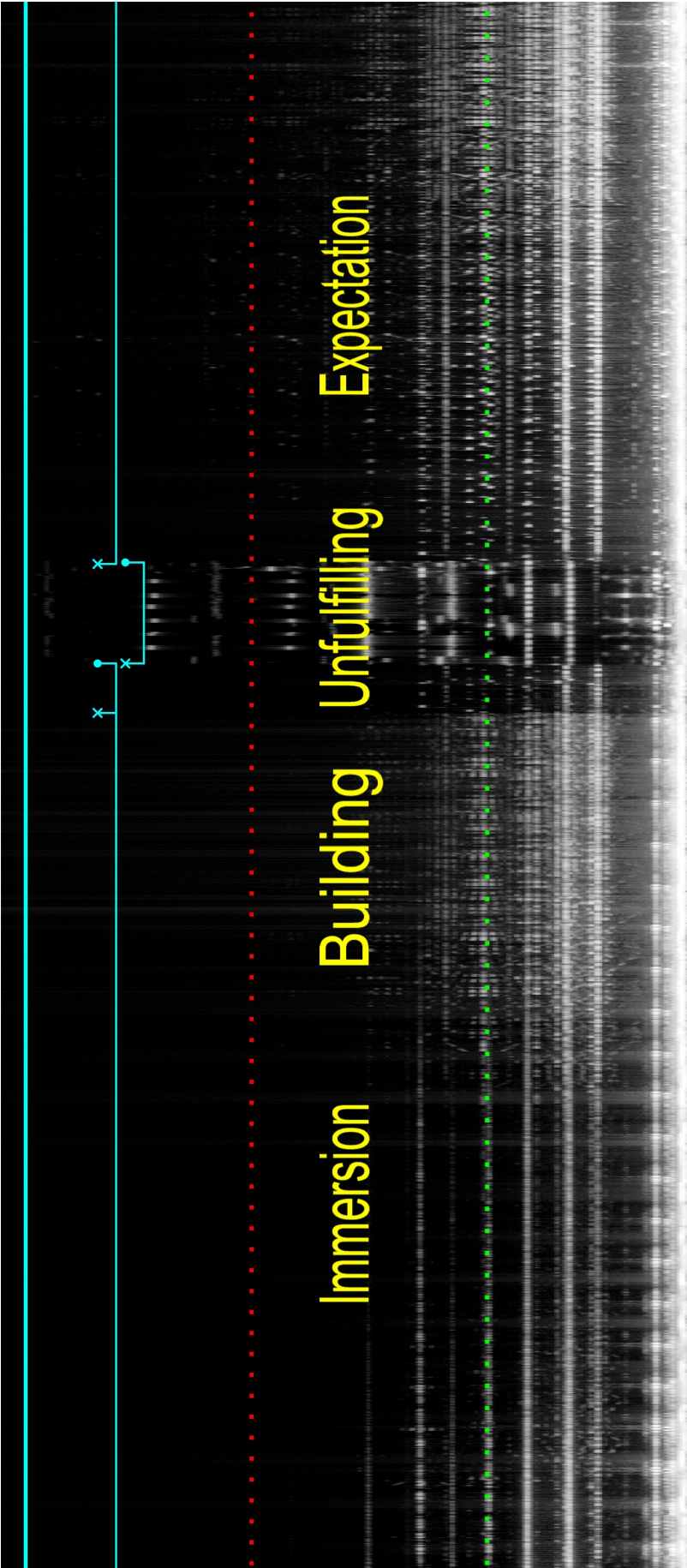
Escalation

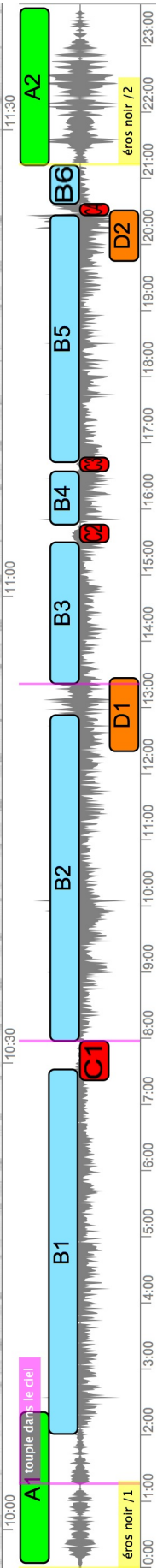
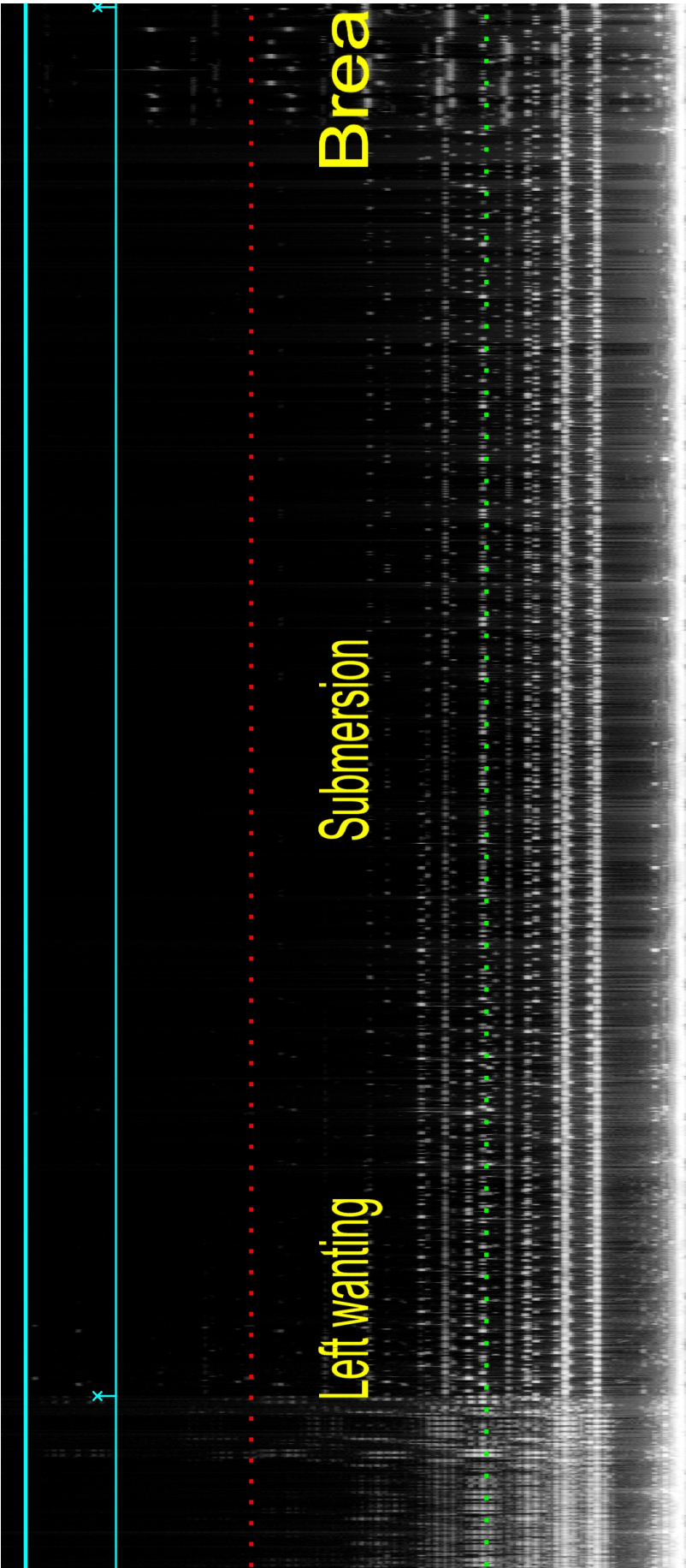
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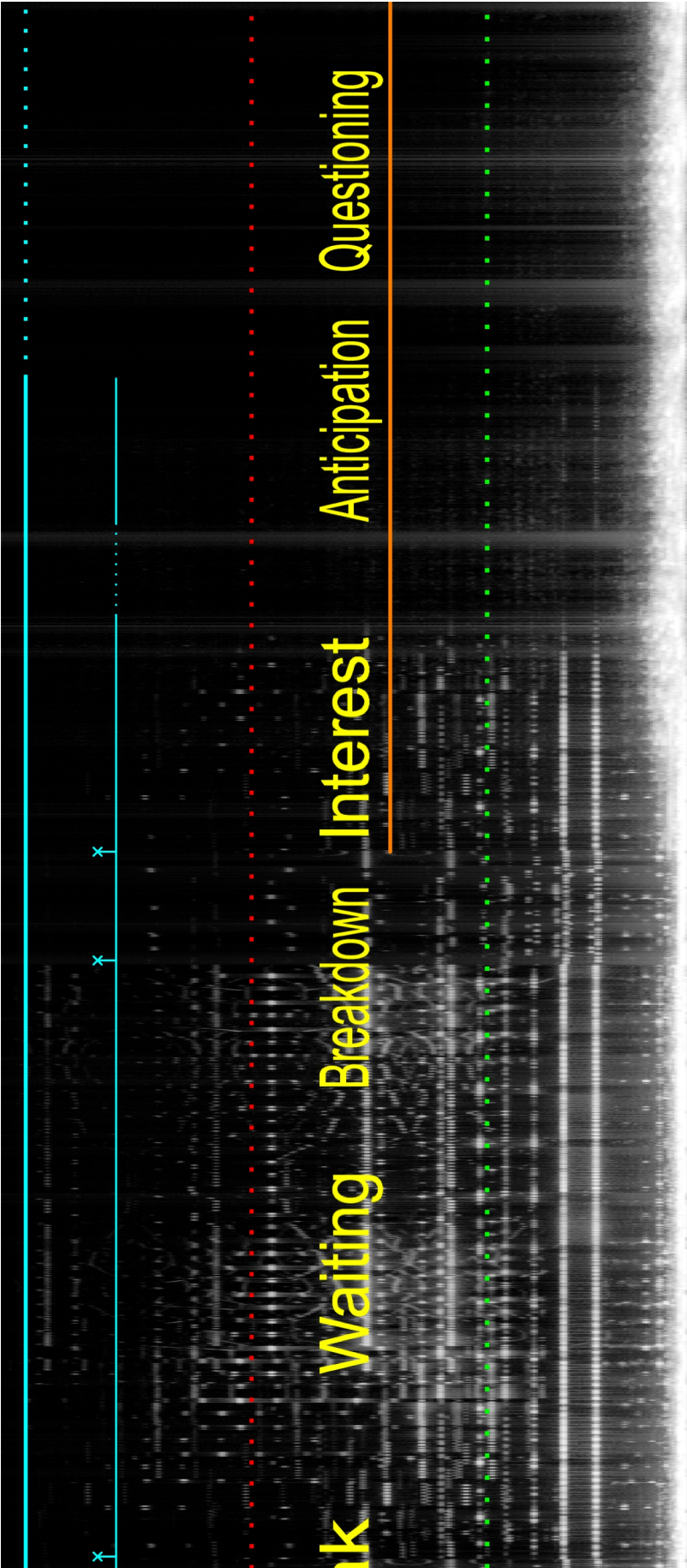




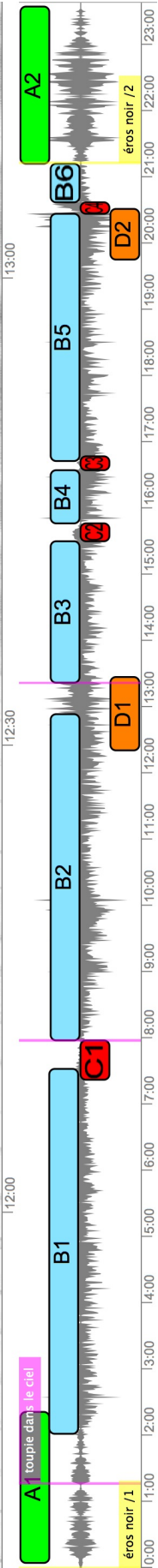


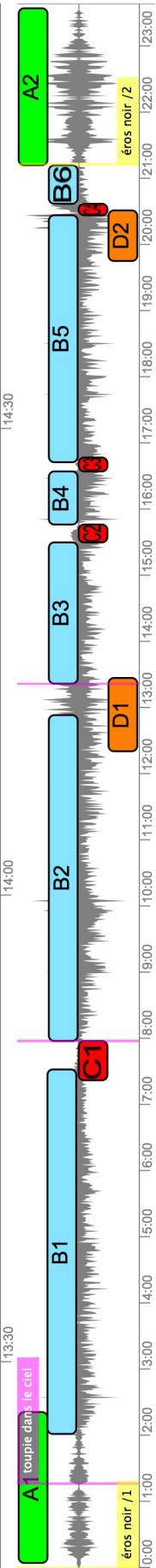
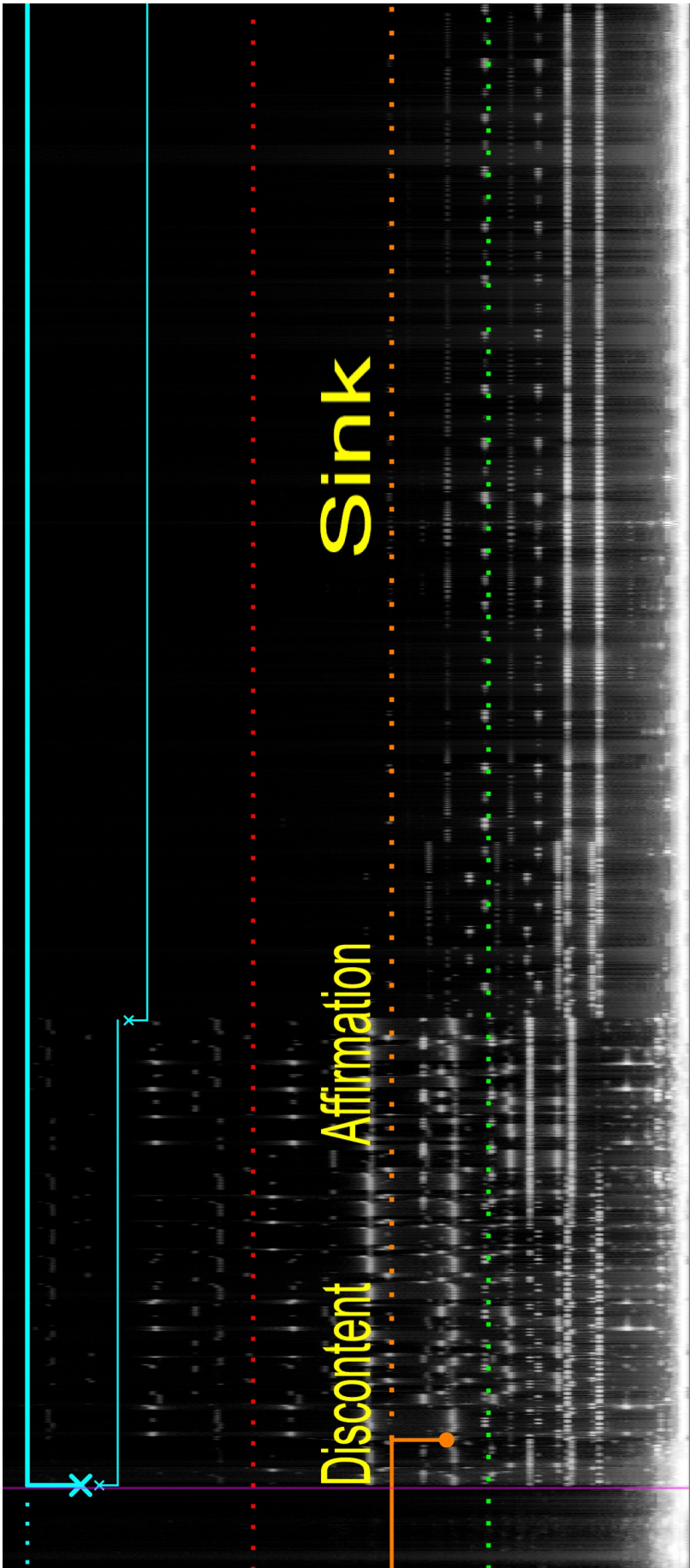


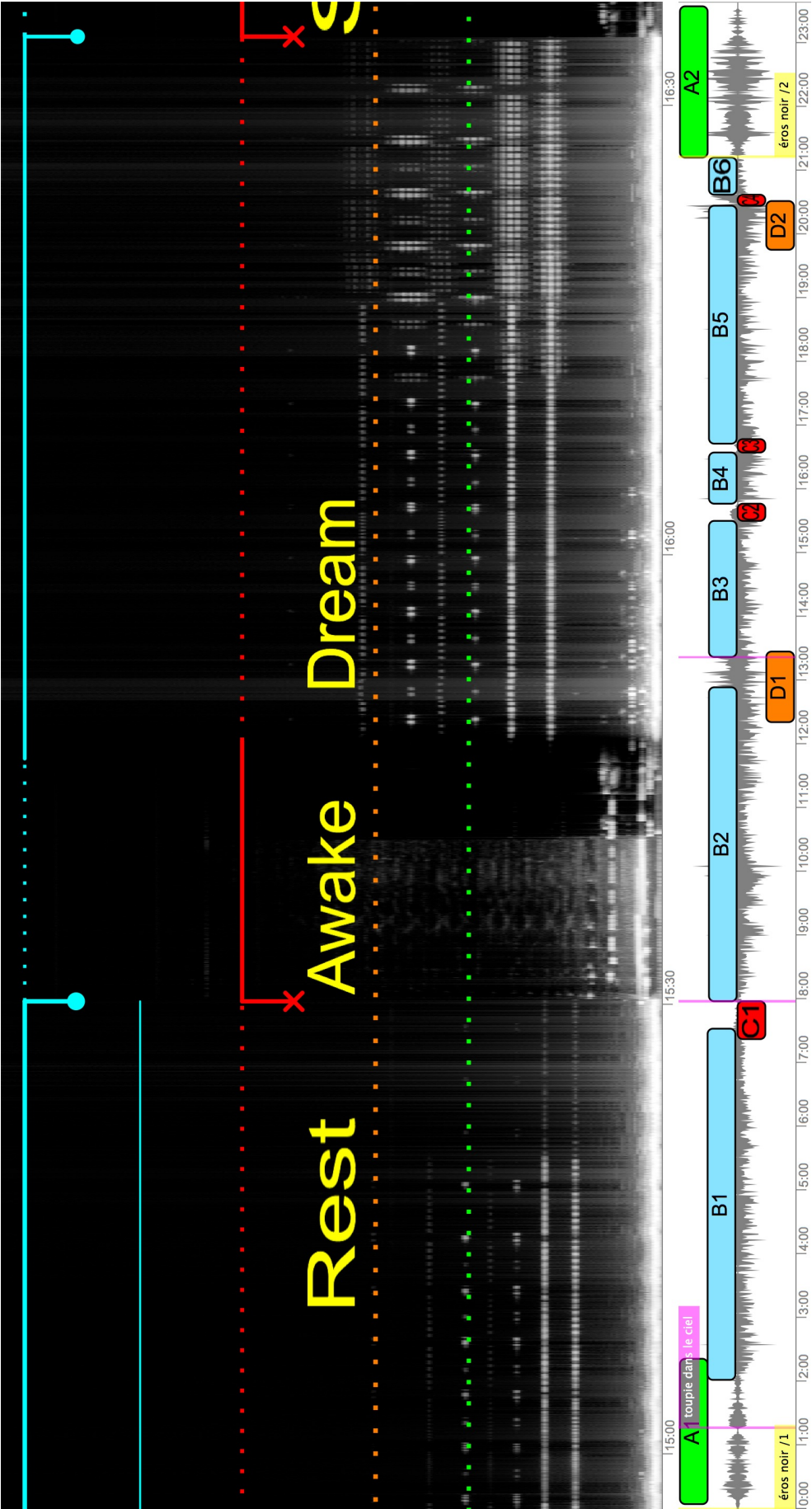


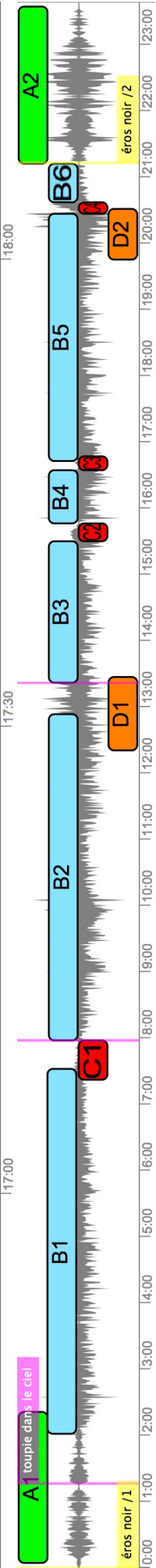
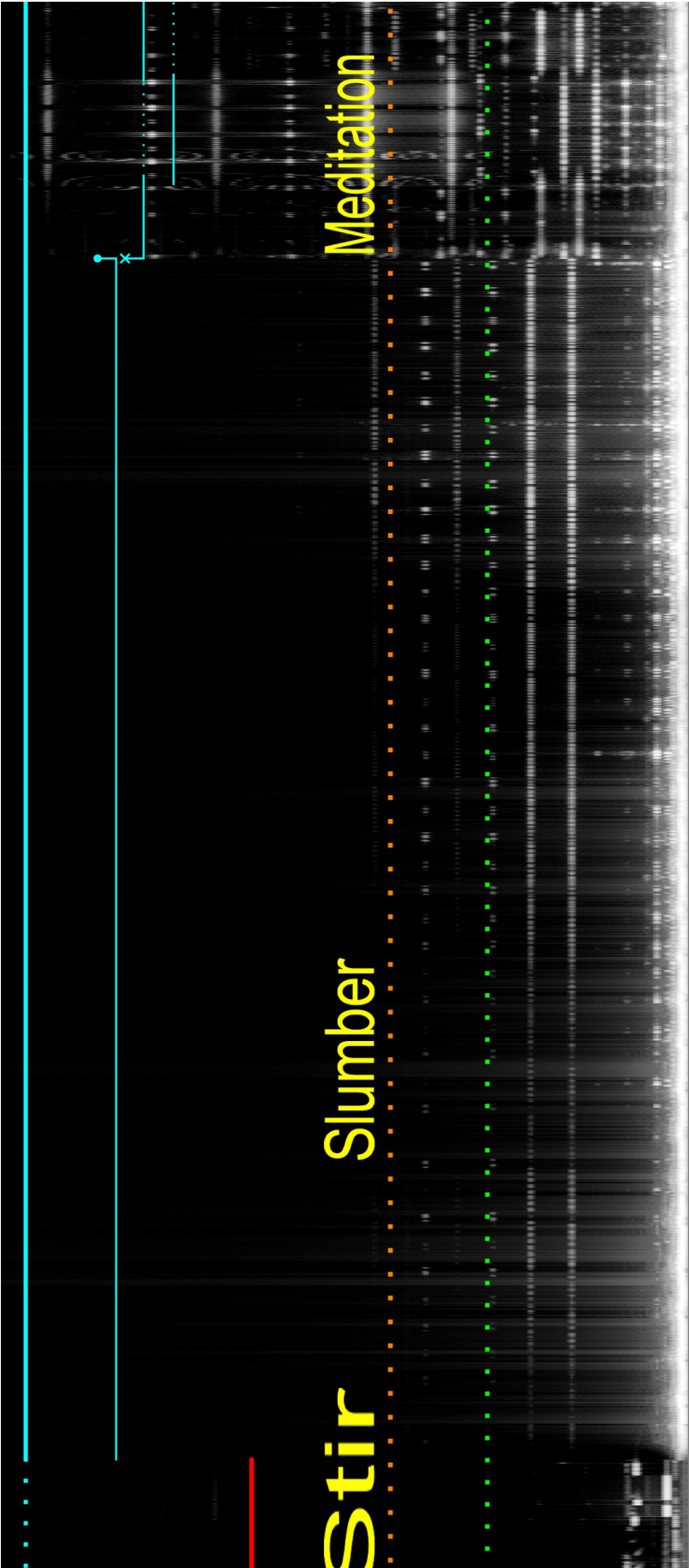


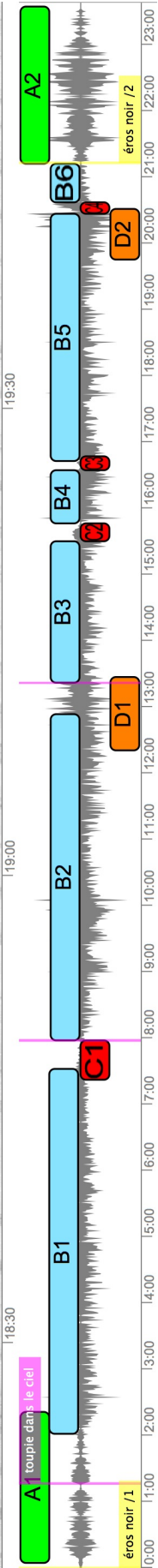
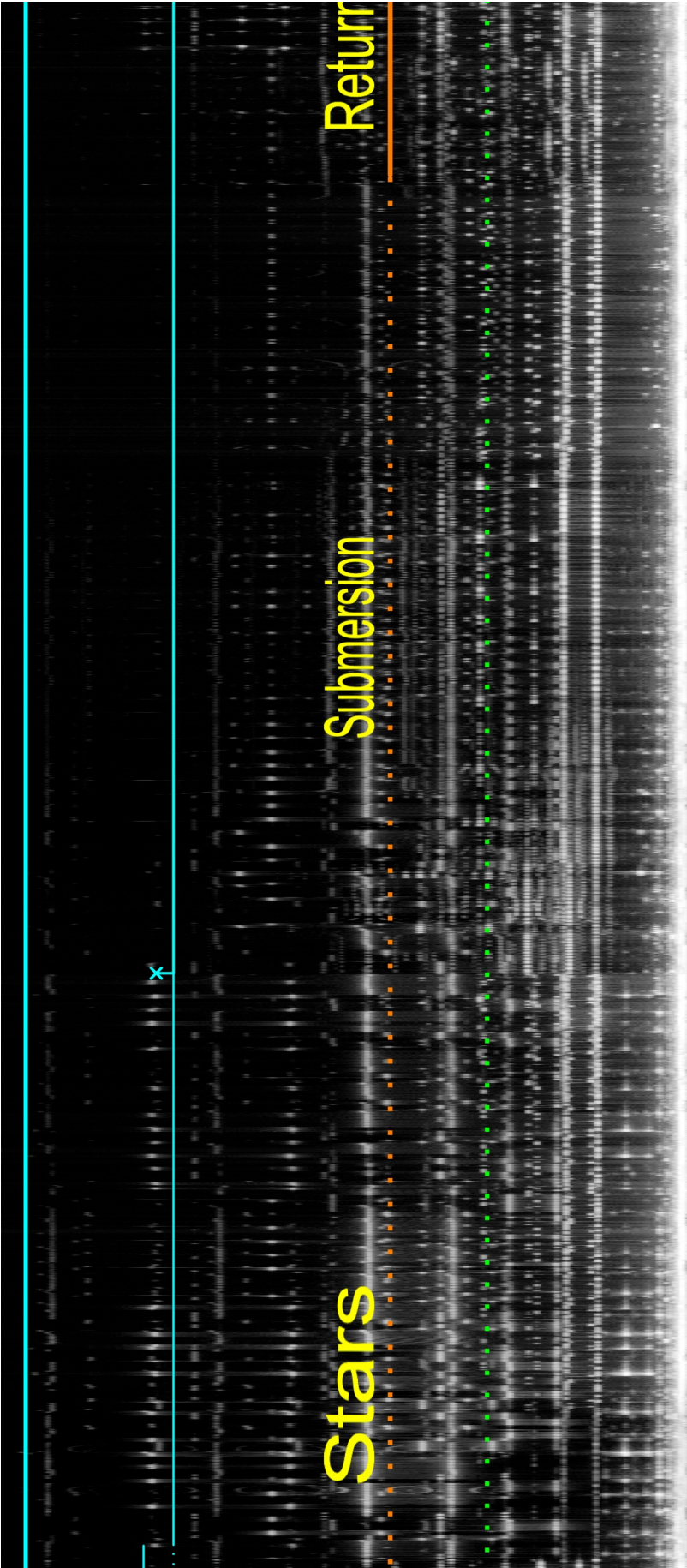
Waiting Breakdown Interest Anticipation Questioning

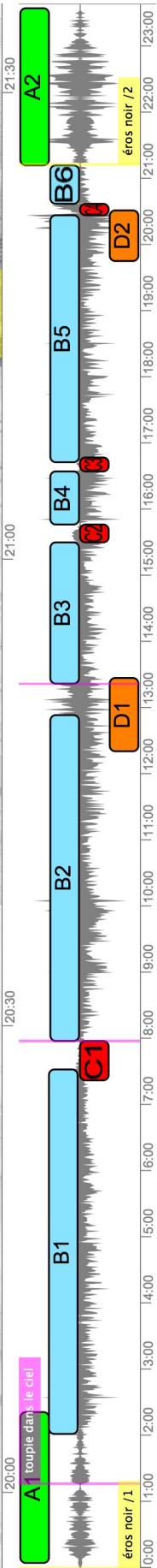
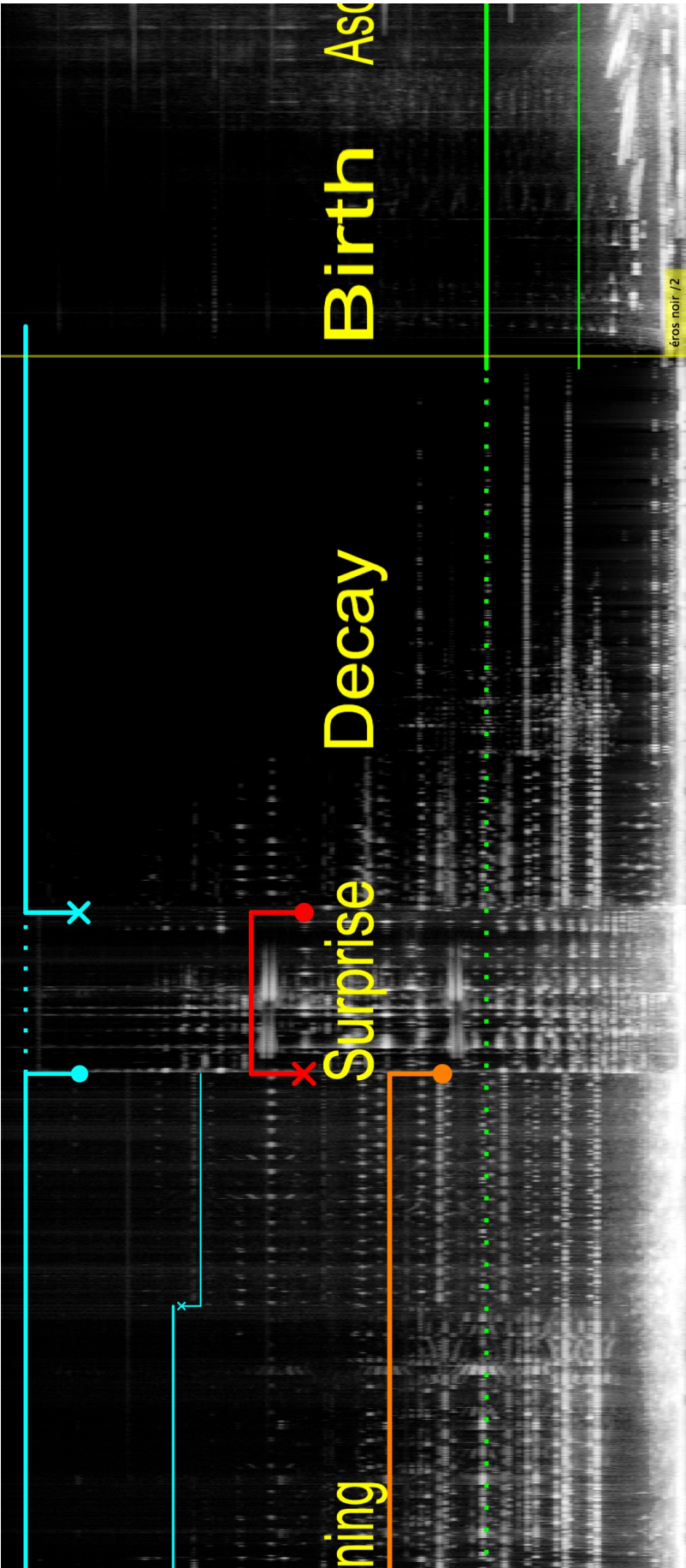


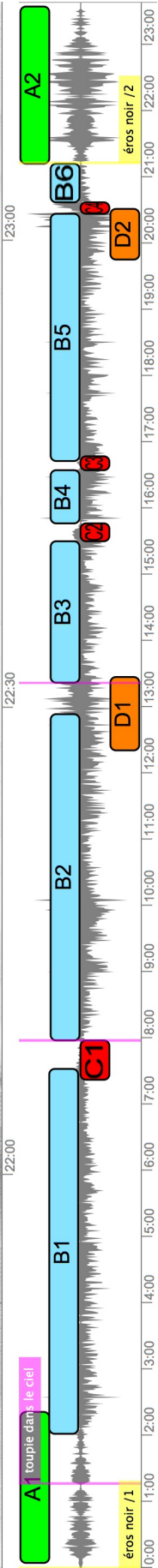
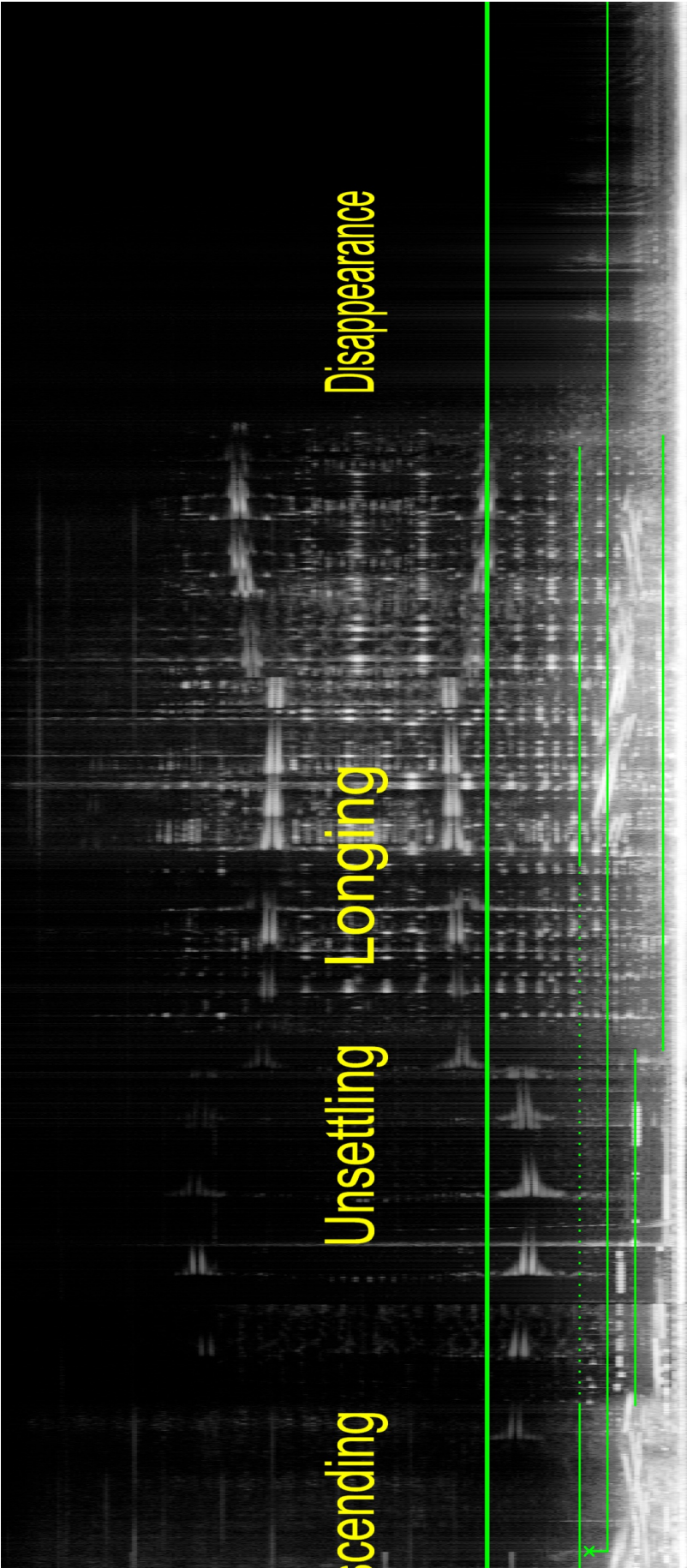


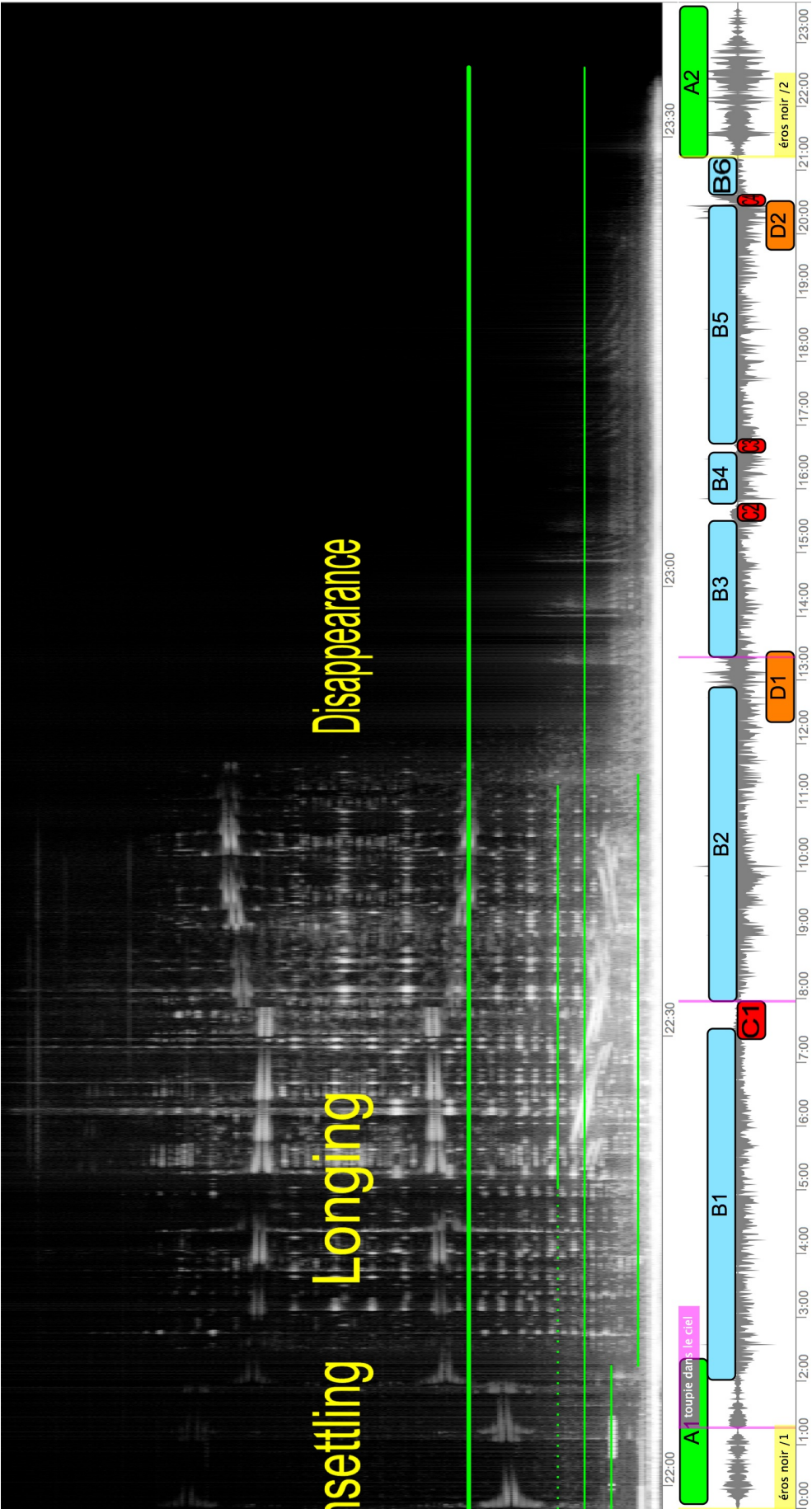




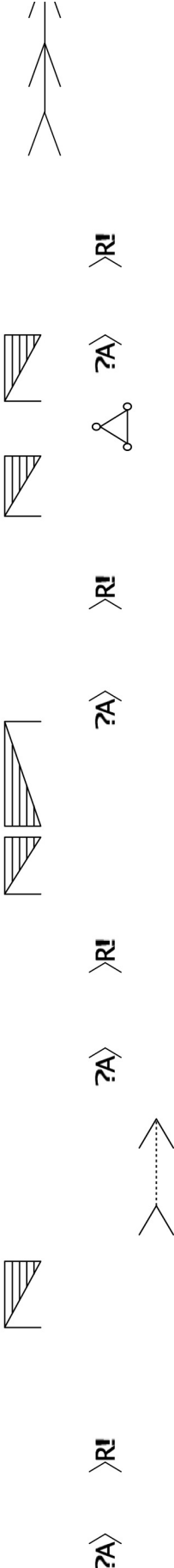
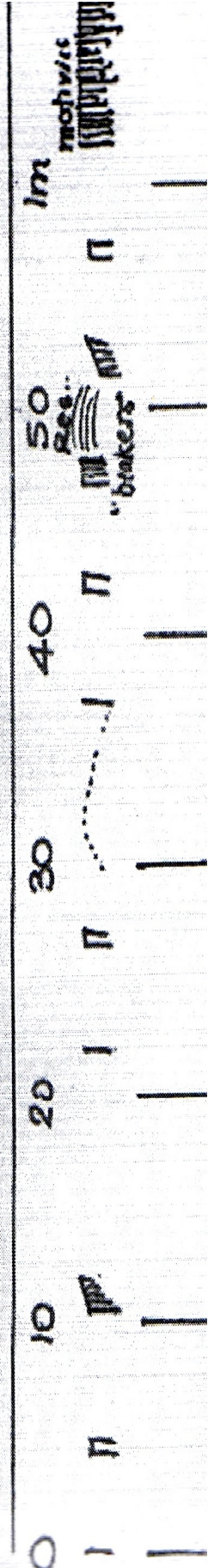
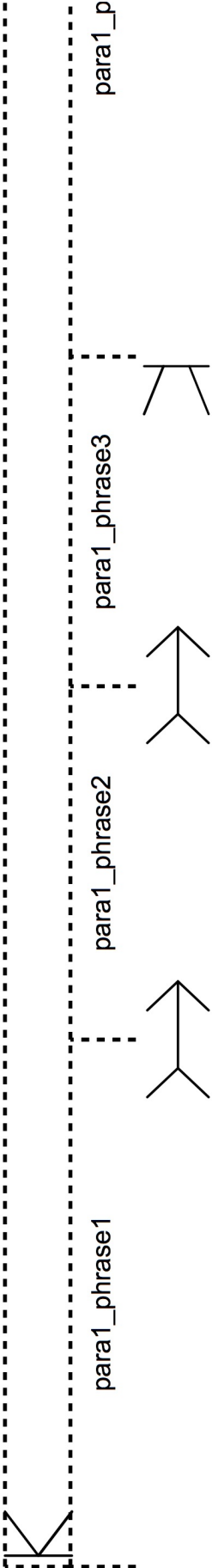








9.5 Appendix 5 – Imago analysis



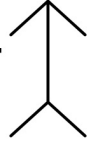
Paragraph 1/Unit 1

_phrase4

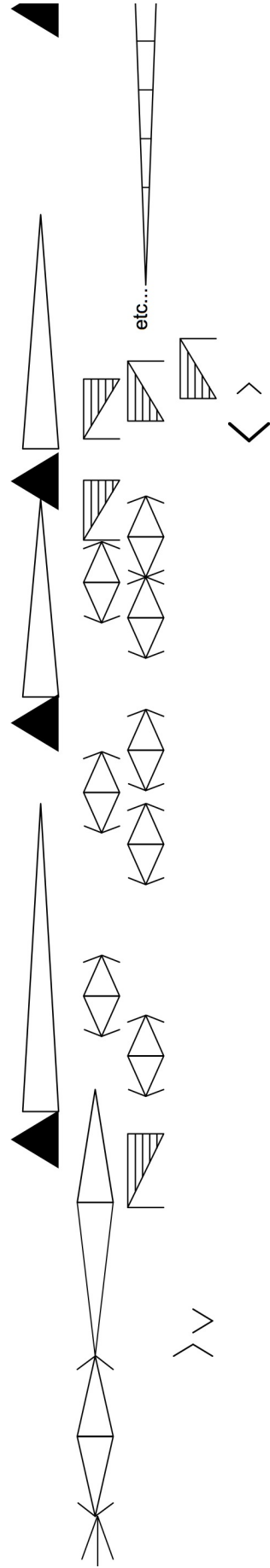
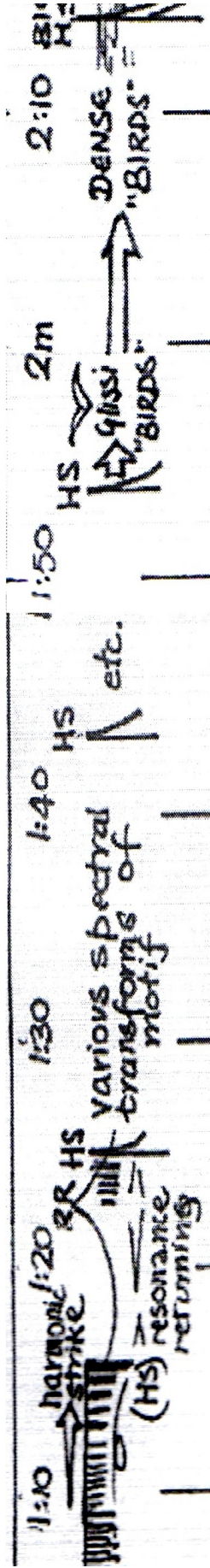


>A> Fugu

para_phrase5

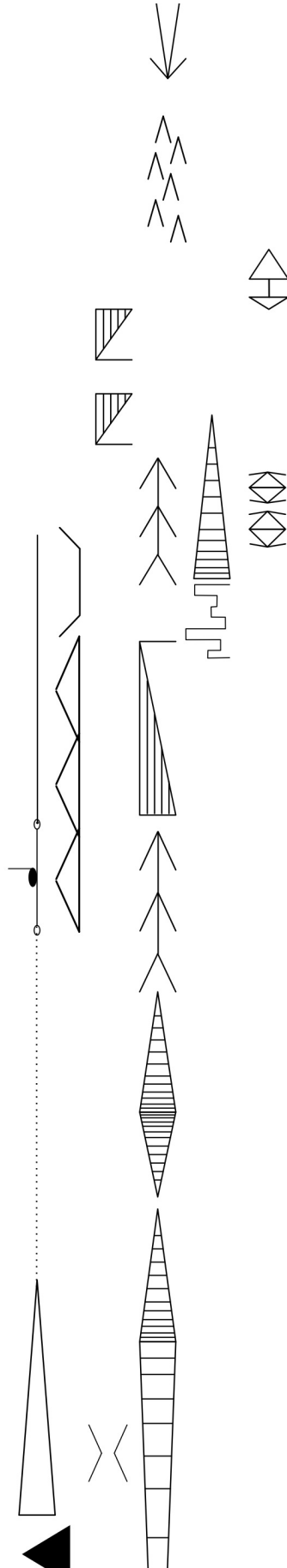
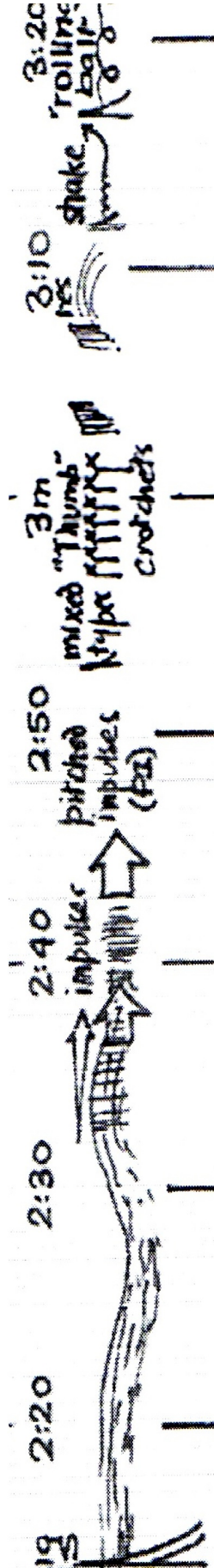
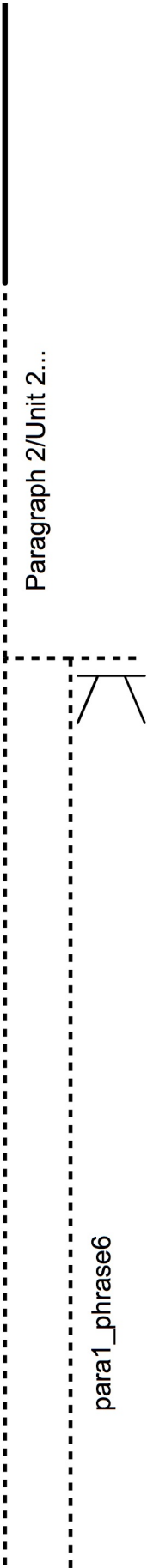


>A> Birds



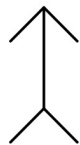
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12:00

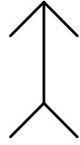


12:30 13:00

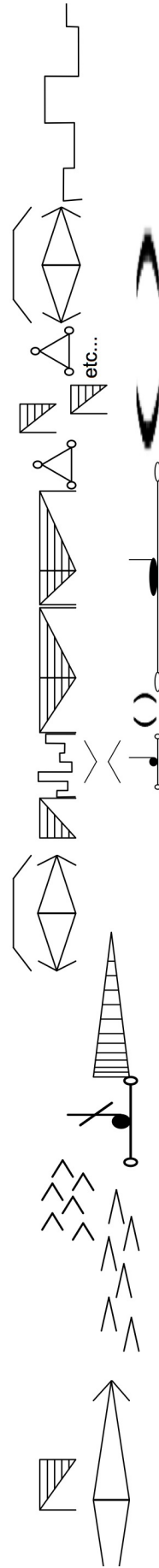
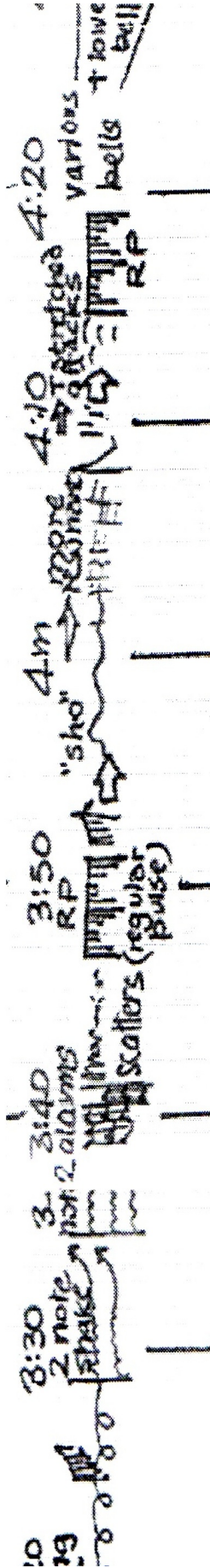
Unit 2



>A> Regular pulse

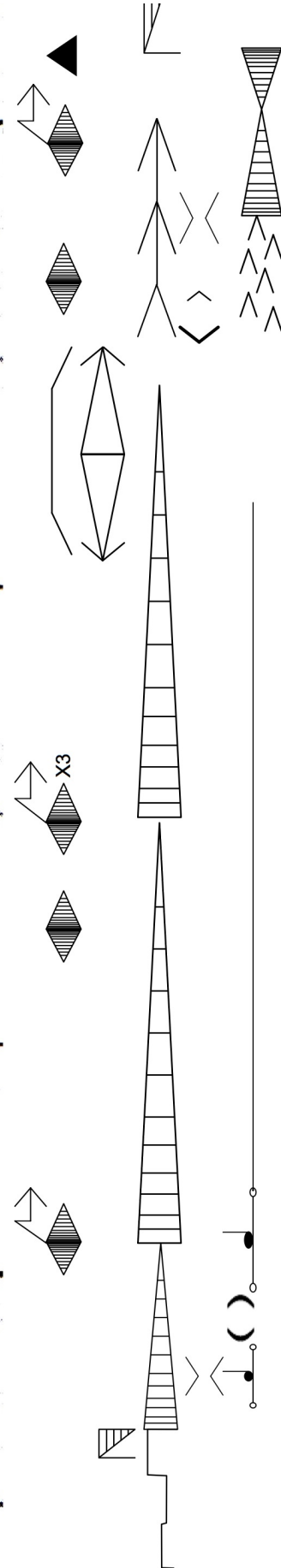
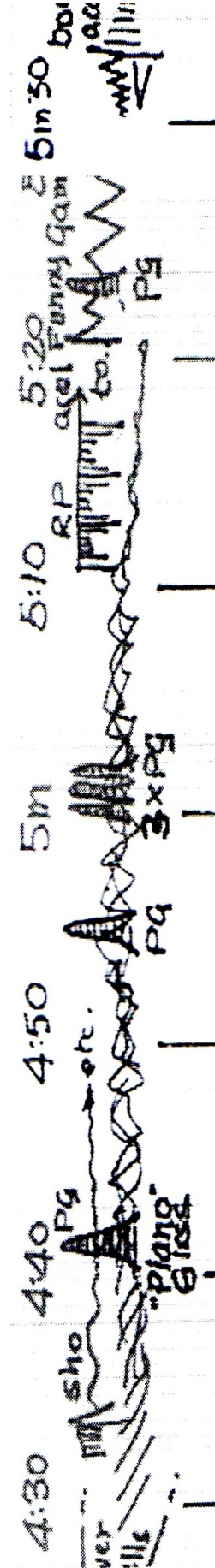


<R< Regular pulse





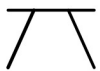
<R> Regular pulse <A> Gamelan



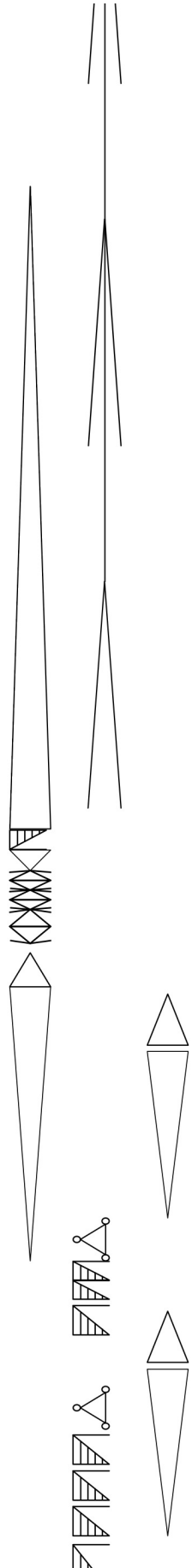
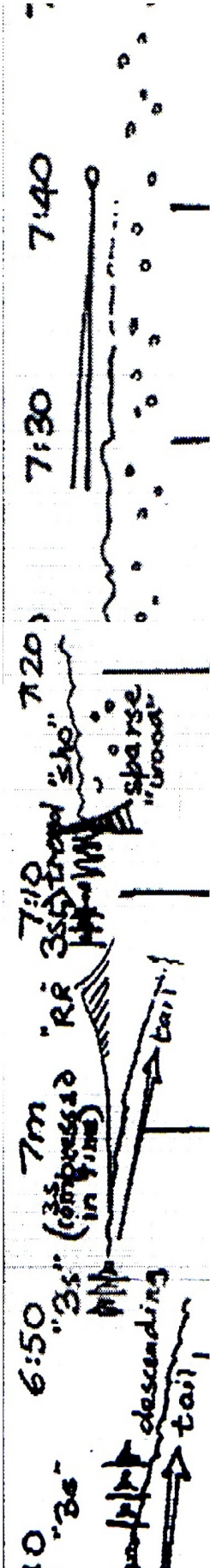
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15:00

15:30



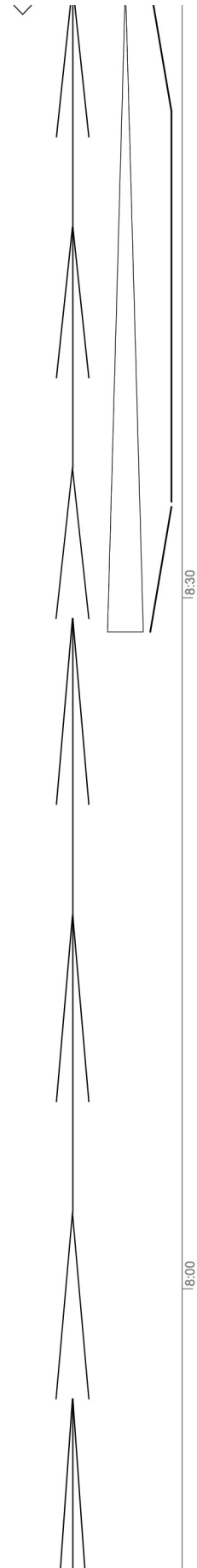
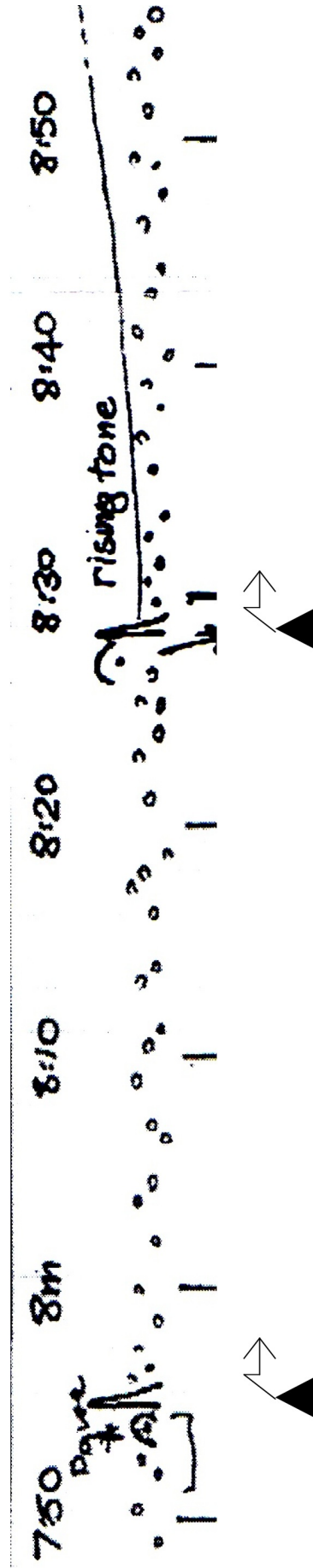
<R> Fugu



17:00

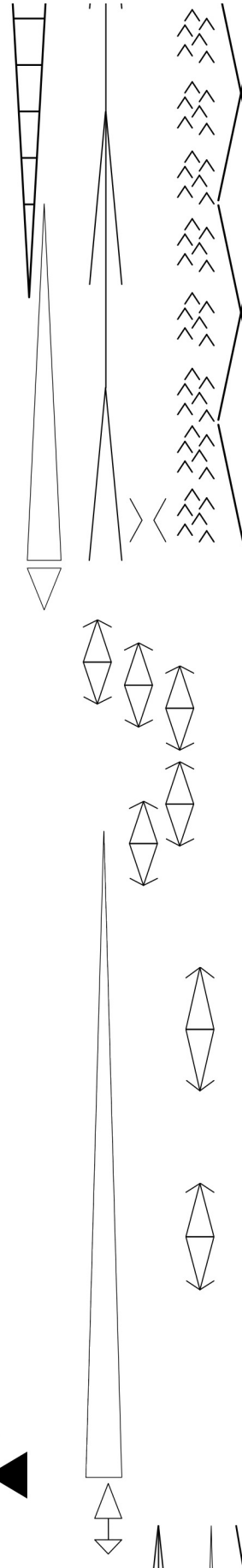
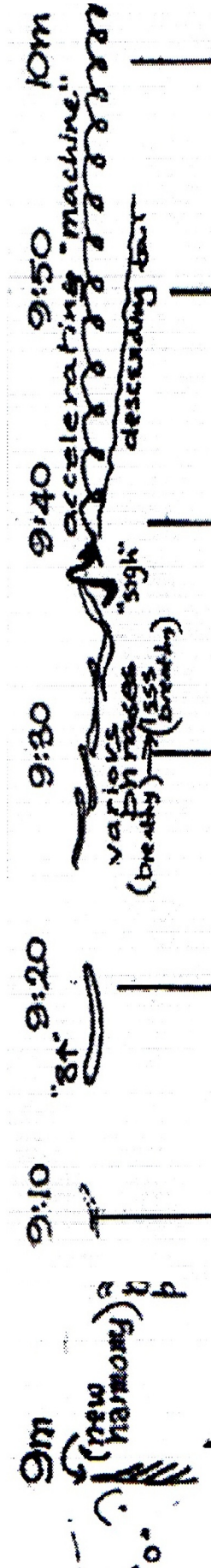
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Unit 4

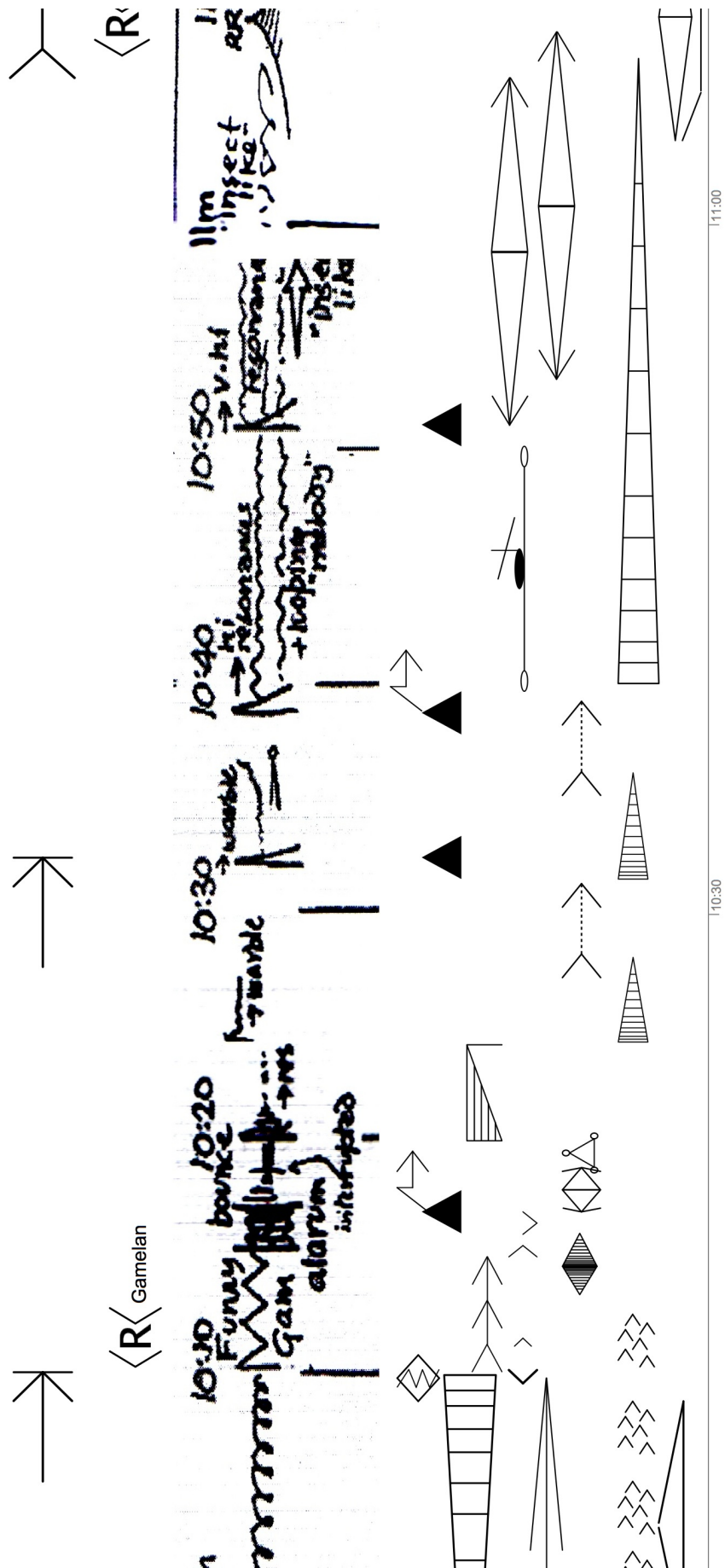




>A> Machine



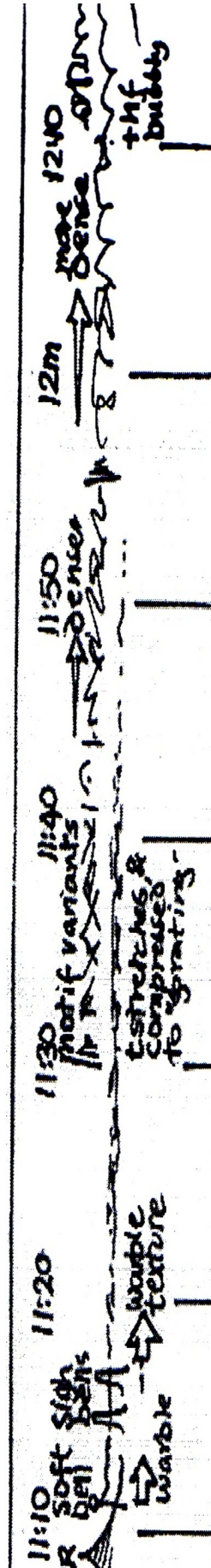
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Unit 5

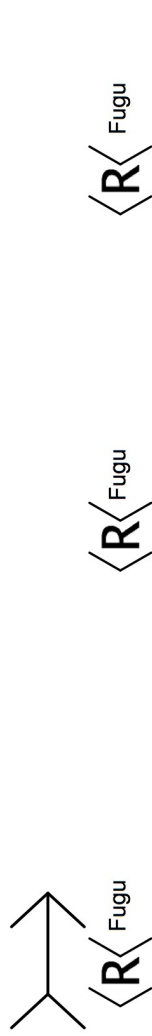


R Fugu



11:30

12:00

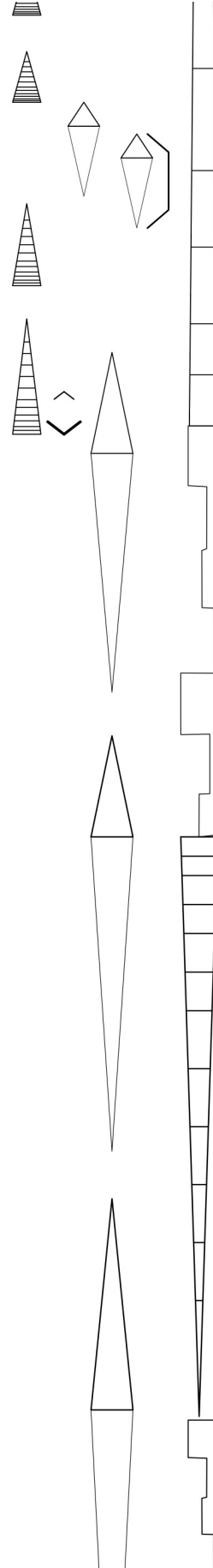
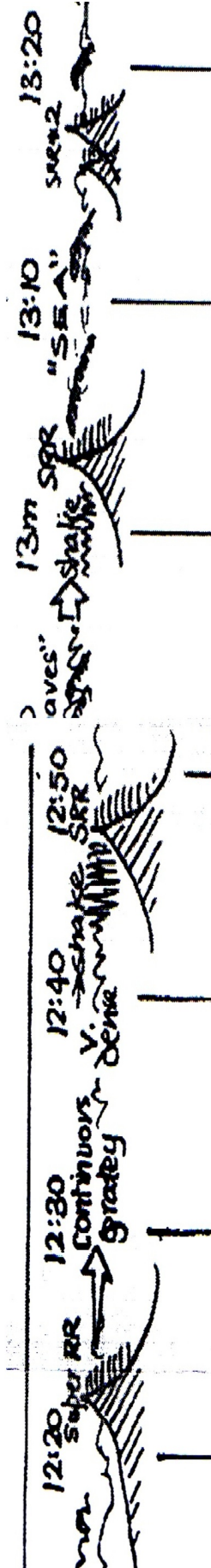


<R> Fugu

<R> Fugu

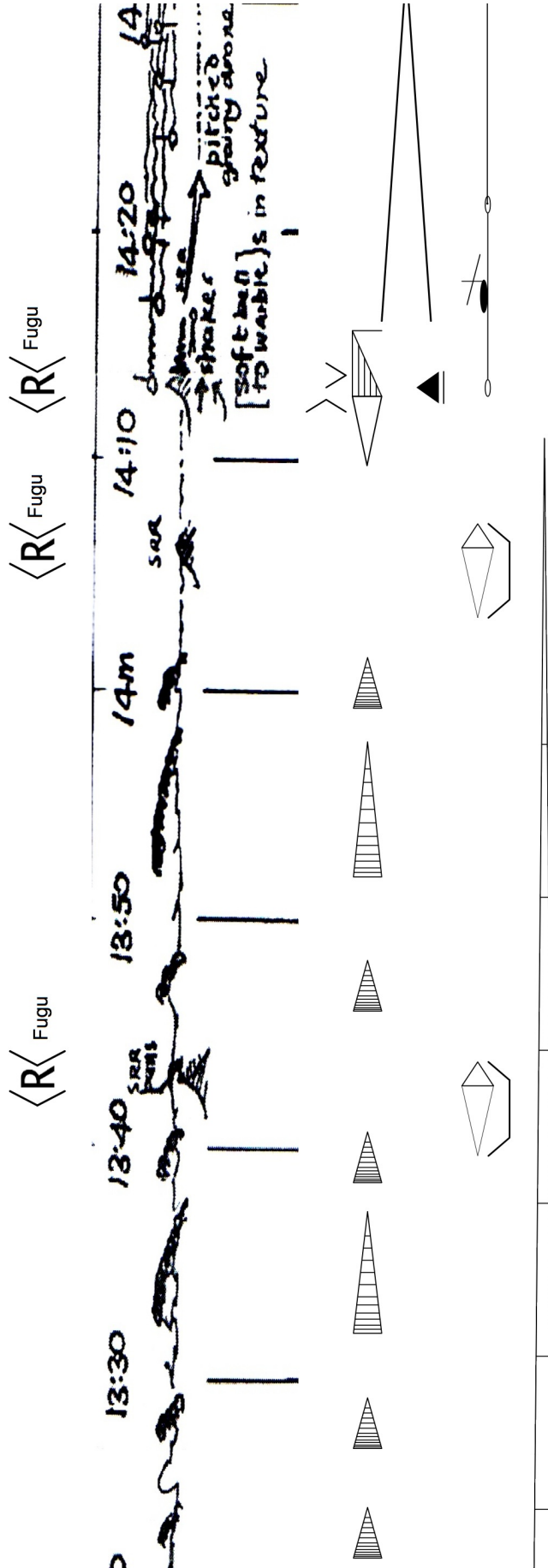
<R> Fugu

<R> Fugu



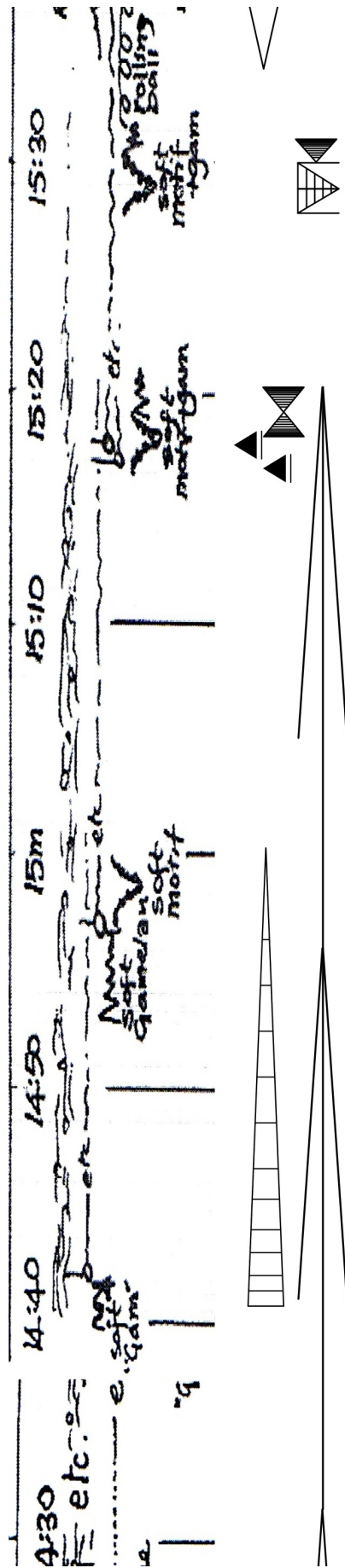
12:30

13:00

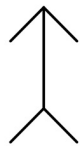
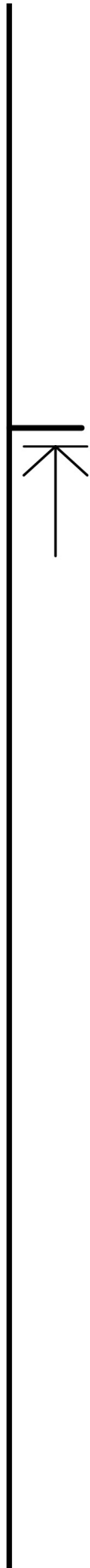


Unit 6

<R> Gamelan <R> Gamelan <R> Gamelan <F>

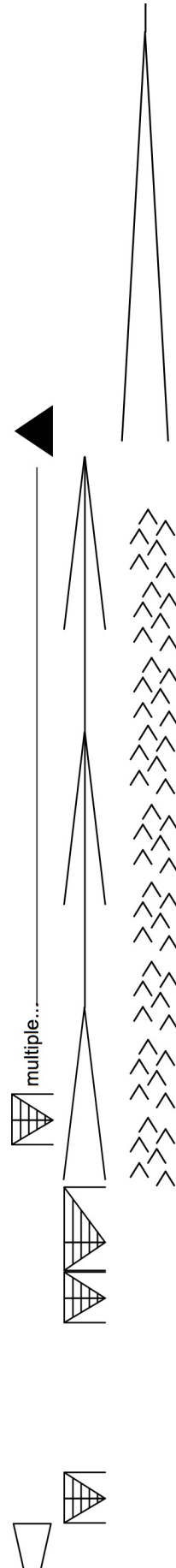
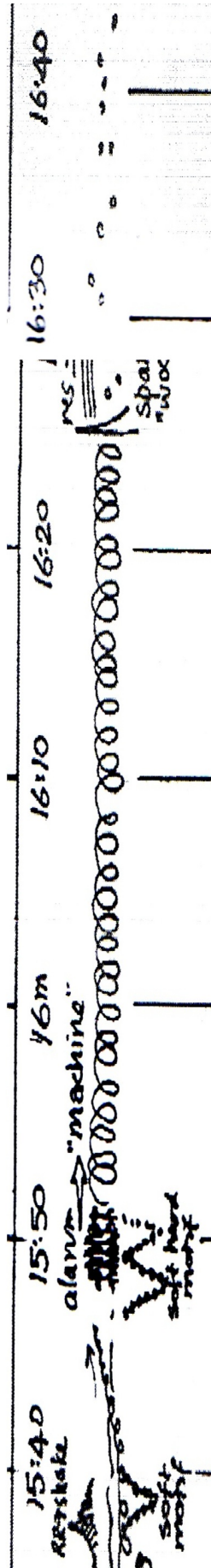


14:30 15:00 15:30



(R) Gamelan

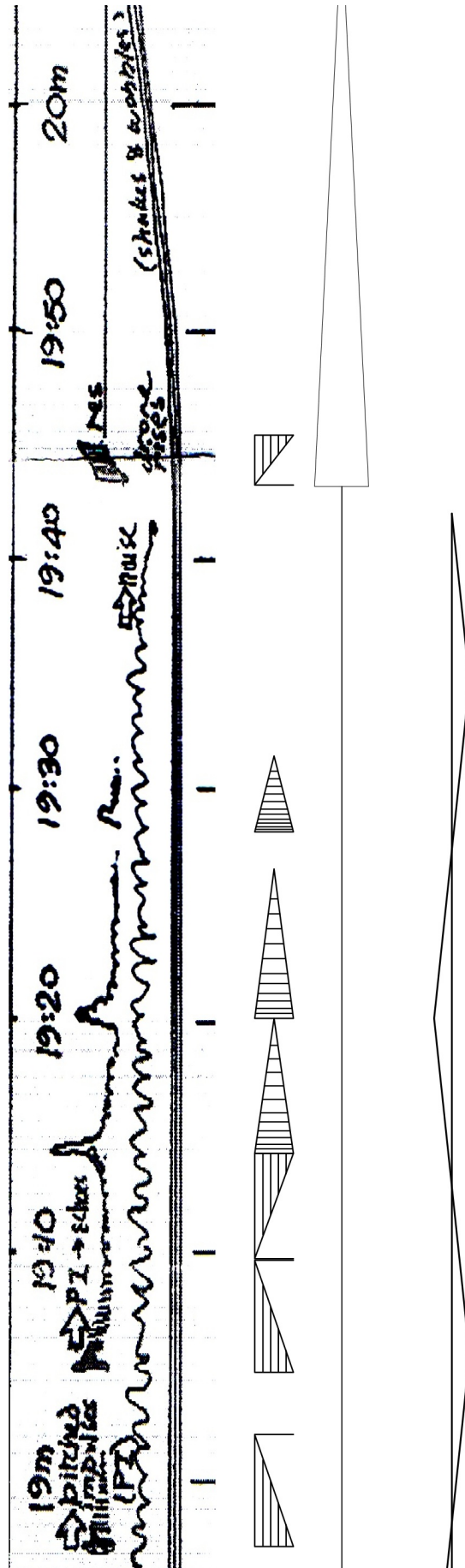
(R) Machine



16:00

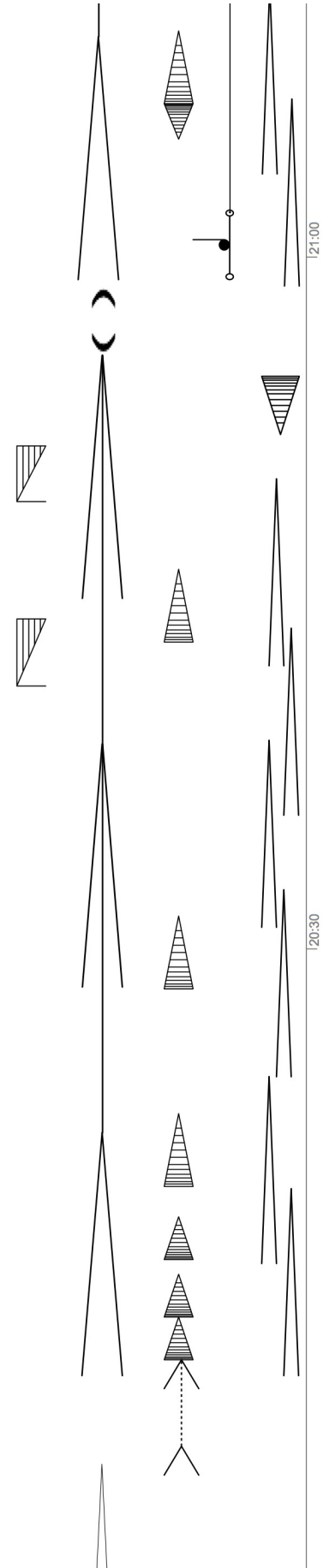
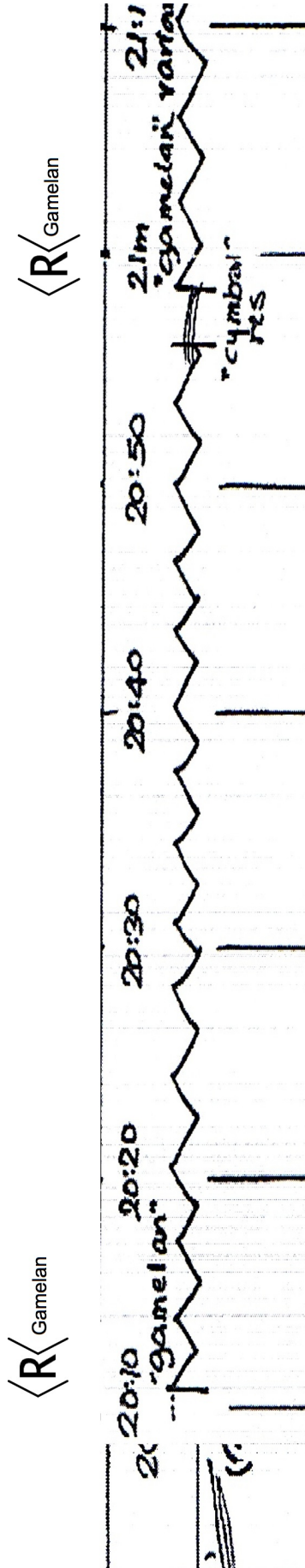
16:30



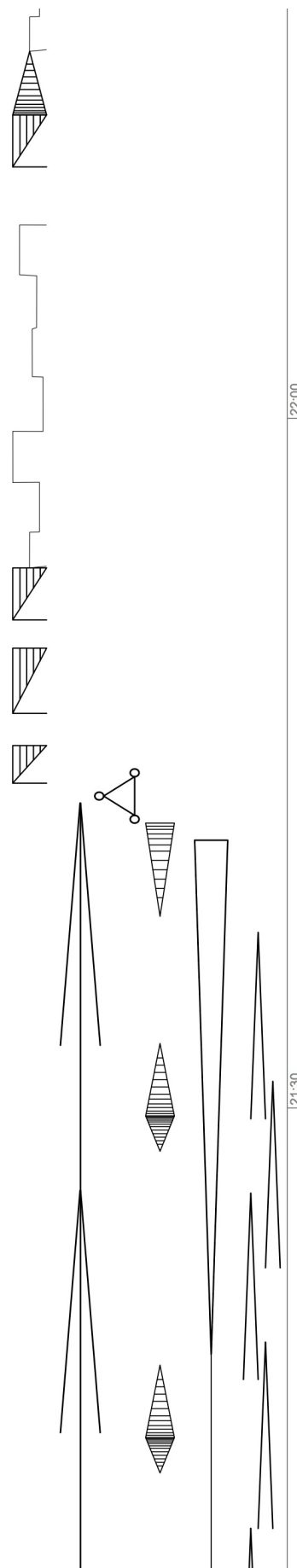
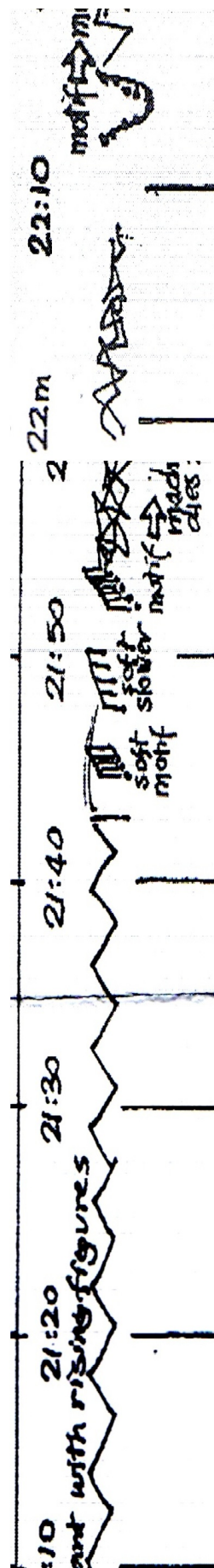


19:00 19:10 19:20 19:30 19:40 19:50 20:00

Unit 9



$$\langle R \rangle_{\text{Machine}} \quad \langle R \rangle_M$$

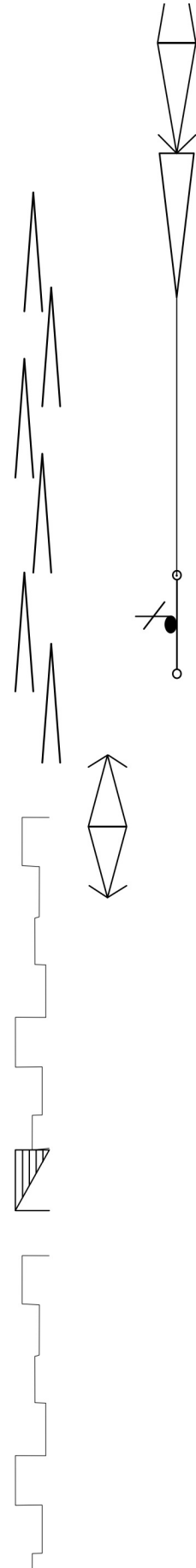
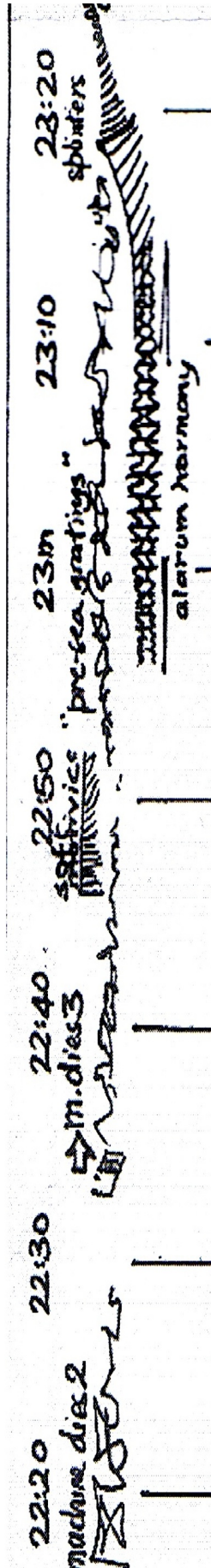




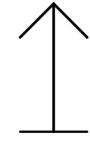
Machine

Machine

Fugu

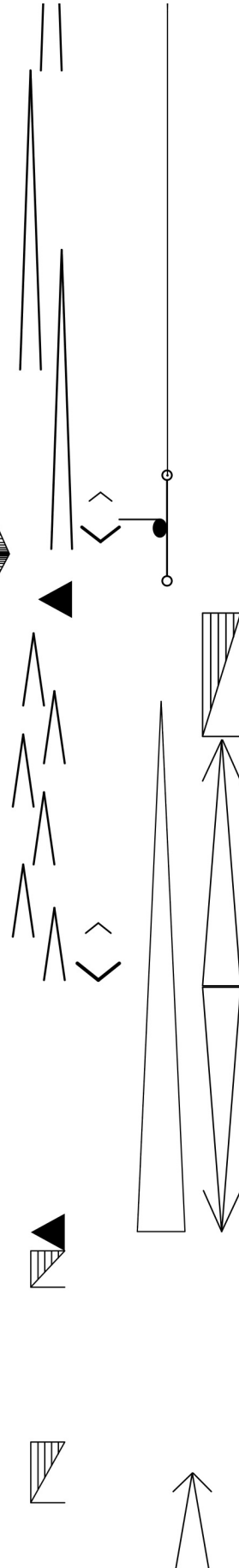
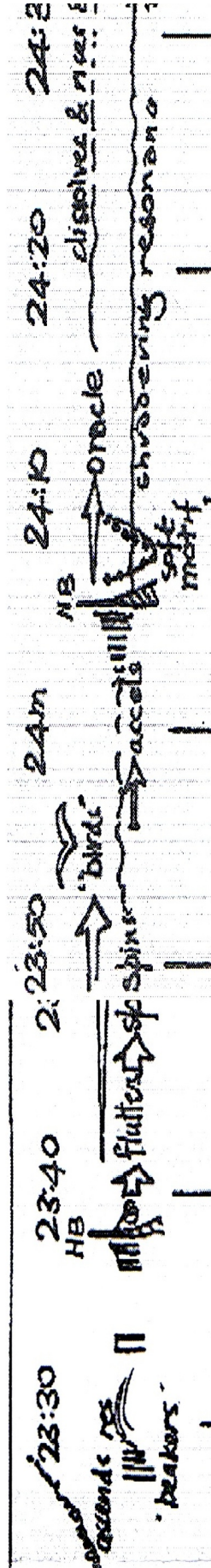


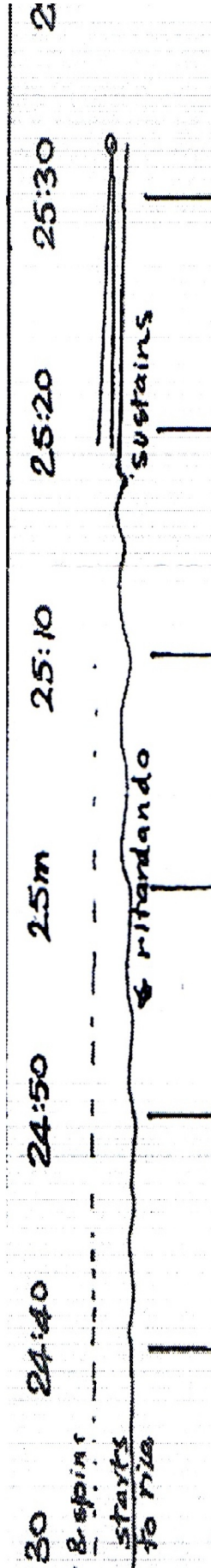
Recapitulation/Unit 11

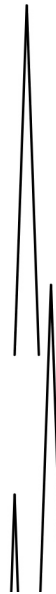
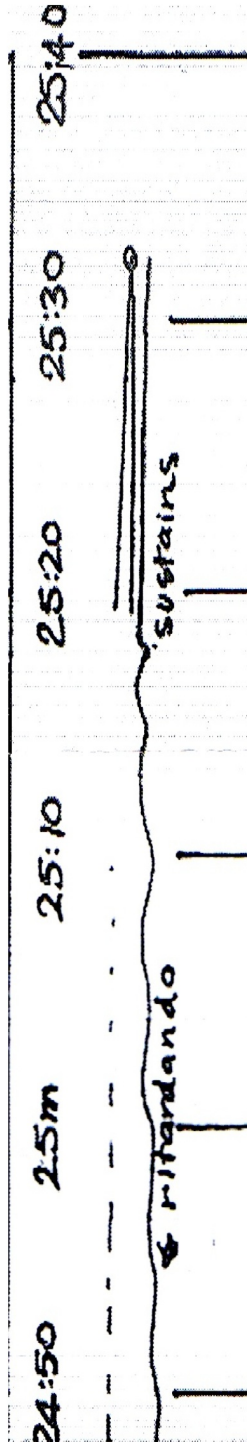
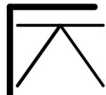


<R> Vocal utterance

<R> Birds







25:30

25:00